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## **CHAPTER 2: ALTERNATIVES CONSIDERED**

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## **CHAPTER 2 - ALTERNATIVES CONSIDERED**

The alternatives described below have been collected from the following sources: (1) *Reno Railroad Study* (SEA 1980), (2) *Revised Project Report - Railroad Merger Mitigation Alternatives Study* (Nolte 1996) and (3) comments received during the Reno Railroad Corridor NEPA scoping period. These alternatives ~~are believed to~~ constitute a full range of options for reducing existing and future adverse effects of railroad traffic operations within and through the City of Reno. This set of alternatives was subjected to a screening process using criteria derived from the Statement of Purpose and Need (see Chapter 1), to arrive at a range of reasonable and feasible alternatives to be documented in the Environmental Impact Statement (EIS).

For purposes of evaluating alternatives and preparing the impact analysis presented in the EIS, it is necessary to make assumptions regarding future operating conditions. At the present time, approximately 12 to 14 freight trains per day operate through the central portion of the City of Reno. Estimates prepared during the merger suggested that up to 24 trains per day could be operating in the central portion of the City of Reno in the year 2000 (5 years beyond the merger), and up to 36 trains per day could be operating in the year 2015 (20 years beyond the merger). While the previously generated estimate for 2000 has not occurred, due to UPRR merger implementation difficulties, growth is still expected in response to an expanding market, and therefore planning projections are being used to assess impacts associated with increased train activity.

Planning horizon years have been established for the Reno Railroad Corridor EIS. In addition to year 1999 and 2000 (representing existing conditions), planning horizon years are 2004 (representing conditions in the near term and reflecting conditions likely to be encountered during project construction) and 2030, the long-term horizon year specified for planning purposes by the Regional Transportation Commission of Washoe County (RTC; the federally designated Metropolitan Planning Organization [MPO] for the ~~City of Reno~~ metropolitan area region). Estimates for 2004 and 2030 traffic conditions have been derived from RTC planning projections.

For rail operations, however, future train volumes are in large part dependent upon market conditions. Recognizing that projecting into the future involves inherent uncertainty, for purposes of the Reno Railroad Corridor EIS, it is assumed that between 12 and 24 trains per day will be operating through the central portion of the City of Reno in the year 2004 and that 24 to 36 trains per day will be operating in the year 2030, corresponding with the previously noted 5-year and 20-year projections. Average freight train length is assumed to be between 6,500 and 8,000 feet, since there is an ongoing trend toward longer trains. Similar to existing conditions, it is assumed that two Amtrak passenger trains will continue to serve the City of Reno each day. These trains are not included in the above counts.

It is assumed that the construction or reconstruction of city streets associated with any of the suggested alternatives would be required to conform with current City of Reno design standards and Master Plan requirements. The streets in the central portion of the City of Reno subject to

such construction or reconstruction include: West Second Street, Keystone Avenue, Vine Street, Washington Street, Ralston Street, North Arlington Avenue, West Street, Sierra Street, Virginia Street, North Center Street, Lake Street, Evans Avenue, Wells Avenue, and Sutro Street.

~~Several~~ A total of 26 alternatives have been considered as part of the Reno Railroad Corridor evaluation process. Sixteen of these were corridor alternatives have been that were initially identified in (1) the *Reno Railroad Study* (SEA, Inc. 1980), (2) the *Revised Project Report - Railroad Merger Mitigation Alternatives Study* (Nolte & Associates, Inc. 1996), and (3) comments received during the environmental scoping period, which are documented in *Reno Railroad Corridor - Task 2: Scoping Summary Report* (Nolte Team; November 1999). Six of these were temporary shoofly alternatives. The alternatives are described in detail in *Reno Railroad Corridor - Task 3a: Alternatives Screening Report* (Nolte Team; December 1999) and are summarized below<sup>1</sup>. This range of alternatives (described in detail in Chapter 2) ~~is believed to~~ constitutes a full range of options for reducing existing and future adverse effects of railroad traffic operations through the City of Reno. ~~Finally,~~ Three build alternatives and a No Build alternative were advanced to the Draft EIS for more thorough evaluation based on the purpose and need. A fourth build alternative has now been identified that is a hybrid of two other build alternatives, and is the Preferred Alternative.

The following sections describe the alternatives evaluated in the alternatives screening process. The detailed screening process is provided in *Reno Railroad Corridor: Task 3A – Alternatives Screening Report* (The Nolte Team 1999). In addition to the No Build Alternative, there are a number of build alternatives that have been suggested. These alternatives have been grouped into three categories: alternatives along the existing railroad alignment, alternatives along other alignments, and shoofly (a temporary rail line needed to provide service during construction of main line improvements) alternatives. Shoofly alternatives have been identified as a separate group in order to avoid creating an unwieldy number of choices resulting from combining build alternatives with shoofly locations.

## **2-1 NO BUILD ALTERNATIVE**

This alternative would leave the existing Union Pacific Railroad (UPRR) rail corridor through the central portion of the City of Reno in its present configuration. The two-track main line would remain at-grade. All existing grade crossings in the central portion of the City of Reno would remain. Rail operations would continue to use standard safety devices such as barriers, warning horns, and whistles as required by applicable federal and state laws and regulations. Improvements to the local street system providing improved local circulation could occur on an ad hoc basis over time, some of which could result in grade separations at individual locations, but no such improvements are proposed as part of this alternative.

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<sup>1</sup> All technical reports developed in support of this EIS are available for inspection at offices of the Federal Highway Administration (Carson City, Nevada); Nevada Department of Transportation (Carson City and Sparks, Nevada); Washoe County Library (Reno, Nevada); Sparks Branch Library (Sparks, Nevada); and Reno City Clerk's Office (Reno, Nevada).

## **2-2 BUILD ALTERNATIVES ALONG THE EXISTING RAILROAD ALIGNMENT**

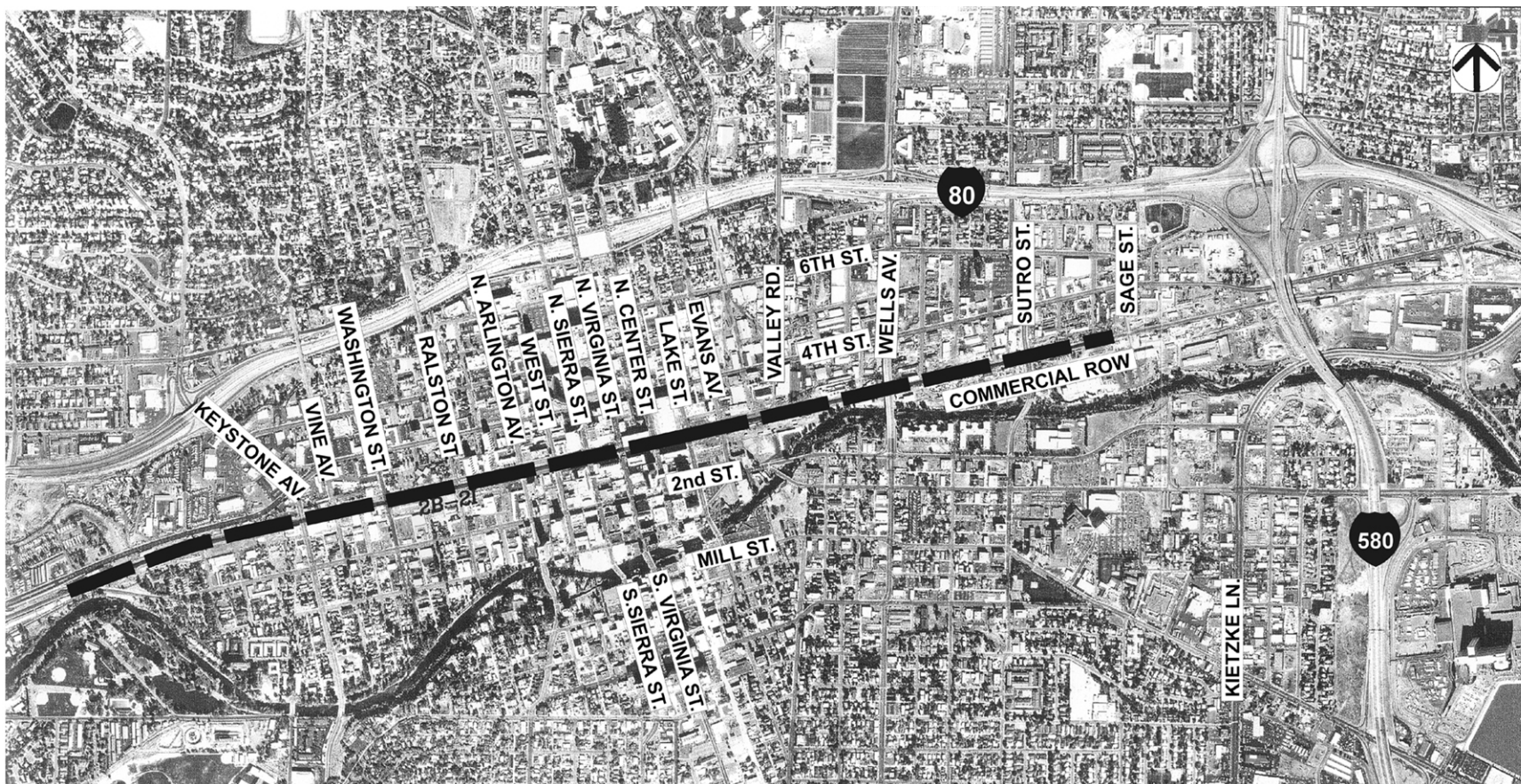
The following alternatives have been proposed along the existing railroad alignment. See Figure 2-1 for the location of these alternatives.

### **● Alternative 2A: Depressed Trainway**

This alternative (the proposed action by the City of Reno), would construct a depressed trainway through the central portion of the City of Reno, extending from approximately West Second Street on the west to Sutro Street on the east, for a distance of approximately 2 miles (2.1 miles, actual distance). A variation of this alternative (suggested during the scoping period) would be to begin the depressed trainway farther to the west, thereby eliminating or reducing the above-grade height of some proposed street overpasses, but at the same time causing the need for closing Second Street. The depressed trainway would be an estimated 54 feet wide, descend and ascend at a nominal grade of 1.0% (a design variation at a grade greater than 1.0% is also under consideration) and would be approximately ~~31~~ 34 feet below grade at its deepest point (see Figure 2-2), thereby permitting a vertical clearance of 23 feet 0 inches. The width of the trainway would be sufficient for the installation of two main line tracks and a continuous parallel private maintenance way. Ten existing at-grade crossings in the central portion of the City of Reno would be reconstructed as bridges over the depressed trainway. A new overpass at Evans Avenue, which currently does not cross the tracks, would also be constructed. One additional crossing—Sutro Street—would be constructed as an underpass beneath the rail line. West Second Street would be permanently closed if the depressed trainway were to be extended farther to the west. Of these 12 crossings, six would be at their existing elevation, but six others (Keystone Avenue, Vine Street, Washington Street, Ralston Street, North Arlington Avenue and West Street) would be elevated by as little as one foot (West Street) to as much as 12 feet (Keystone Avenue). These elevations are associated with the 1.0 percent railroad grade. If a steeper grade can be constructed, it may be possible to eliminate the added street elevations in all but a few locations. In order to construct this alternative, a temporary rail line (known as a “shoofly”) would need to be constructed and operated until the depressed trainway is open for ongoing rail operations (see Section 2-4).

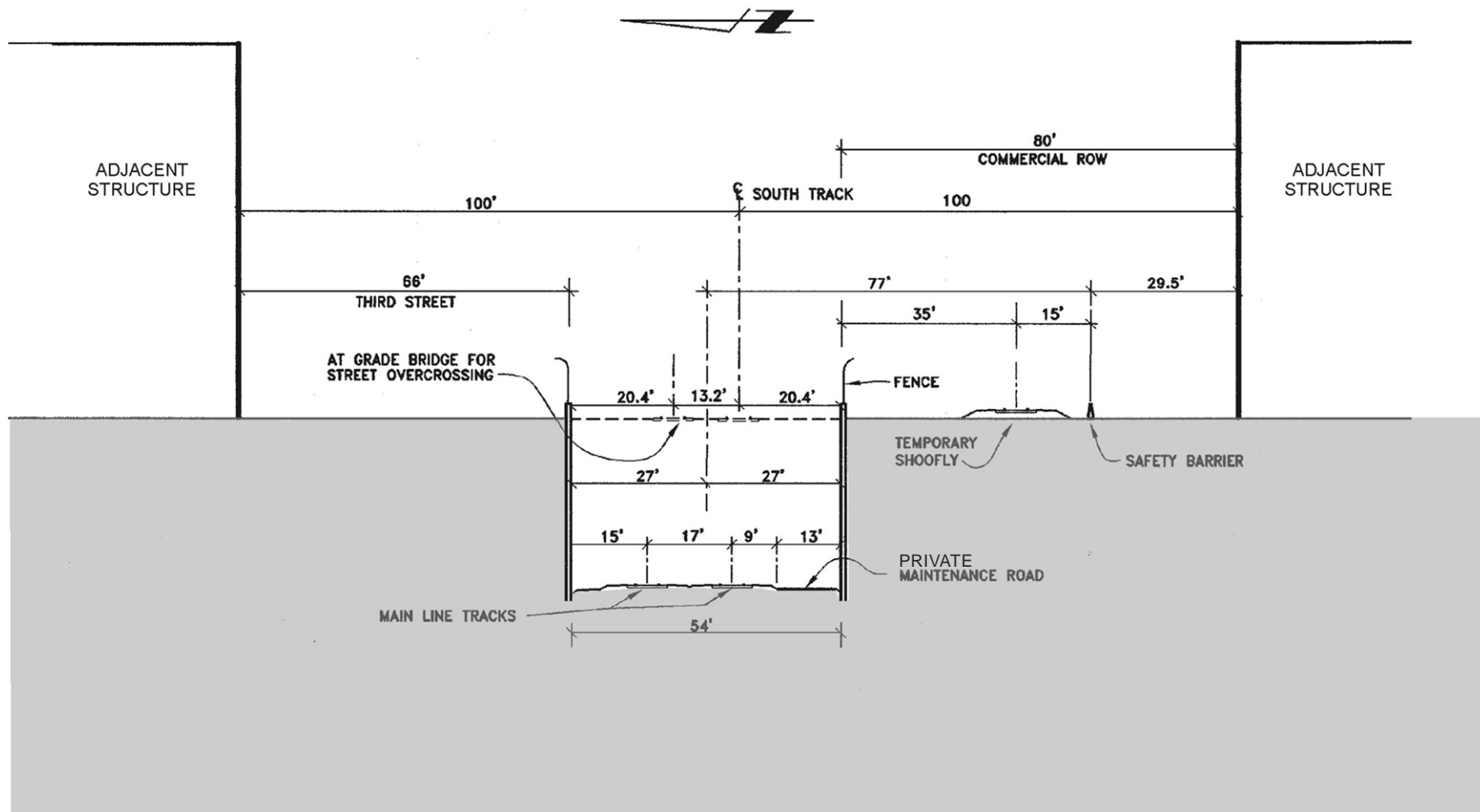
### **● Alternative 2B: Partially Depressed Trainway**

This alternative (considered in [SEA 1980] and [Nolte 1998]) would also construct a depressed trainway, but not to the full 34-foot depth. Rather, it would be constructed to the approximate depth of groundwater (15-20 feet below grade in the shallowest locations). This alternative would eliminate the need to handle other than incidental amounts of groundwater in the corridor study area, which is known to be contaminated. Grade separations with the local street system would be constructed at the same locations as in Alternative 2A (Depressed). They would, however, be constructed on overpasses at reduced heights above grade, but yet permitting the required vertical clearance for rail operations. The required clearance beneath the overpasses to the trainway would be 23' 0". Also, vertical clearance beneath new overpass structures would



Sources: Stantec, 1999; Myra L. Frank & Associates, Inc., 2000.

**Figure 2-1: Alternatives 2A-2I – Corridor Limits**



Sources: Stantec, 1999; Myra L. Frank & Associates, Inc., 2000.

**Figure 2-2: Alternative 2A – Depressed Trainway  
(Typical Cross Section)**

either need to be a minimum of 16' 6" in order to permit traffic to pass beneath on parallel roads (Commercial Row and Third Street), or the parallel roads would need to be terminated at the overpasses, resulting in a series of one-way couplets through the central portion of the City of Reno. In order to accomplish this, the depth of the partially depressed trainway would need to be approximately 7 feet below grade; deeper than this would create the one-way couplet configuration. This alternative would also require a temporary shoofly and it would preclude the use of Commercial Row for that purpose, because the area would be needed for construction of the overpass structures and insufficient height would be available for a temporary rerouting of freight traffic to pass beneath. A cross section illustrating this alternative is shown in Figure 2-3.

### ● **Alternative 2C: At-Grade Trainway with Overpasses**

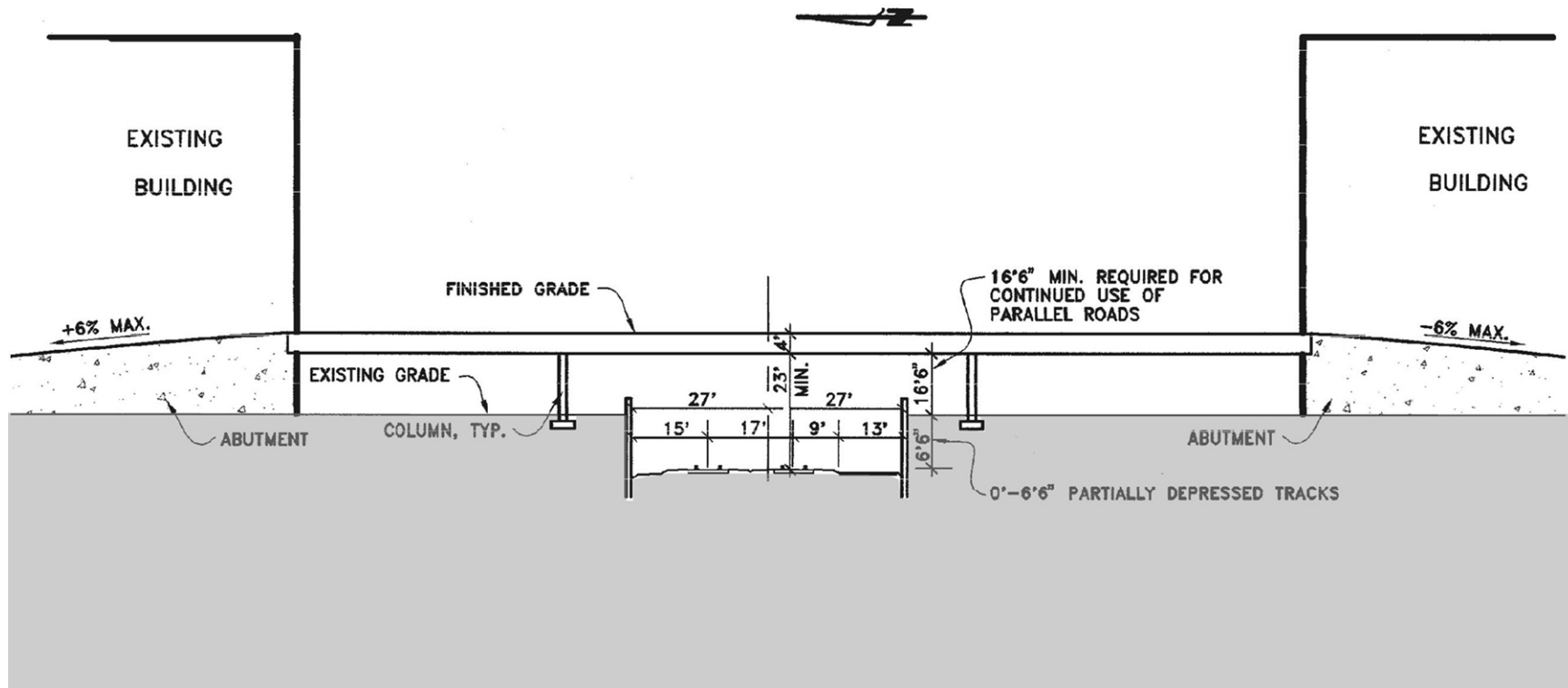
This alternative (considered in [SEA 1980]) would leave the existing rail corridor at-grade and would construct a grade-separated rail corridor by means of overpasses through the central portion of the City of Reno, at the same locations as in Alternative 2A (Depressed). Vertical clearances of 23 feet would be needed beneath each overpass structure, in accordance with national standards. At a 6 percent grade, a horizontal distance of 750 feet on either side the trainway centerline (or a total distance of 1,500 feet) would be needed to bring the elevated roadway down to grade to meet the existing street system. A temporary shoofly would not be required for this alternative, however, since the existing rail line could remain operational during construction. A cross section illustrating this alternative is shown in Figure 2-4.

### ● **Alternative 2D: At-Grade Trainway with Underpasses**

This alternative (considered in [SEA 1980] and [Nolte 1998]) would leave the existing rail corridor at-grade (similar to Alternative 2C [Overpasses]) and would construct a grade-separated rail corridor by means of underpasses through the central portion of the City of Reno, at the same locations as in Alternative 2A (Depressed). The required vertical clearance between the at-grade trainway and underpasses would be 16' 6". At a 6 percent grade, a horizontal distance of 550 feet on either side the trainway centerline (or a total distance of 1,100 feet) would be needed to bring the underpass roadways up to grade to meet the existing street system. Figure 2-5 illustrates a typical cross section for this alternative along the trainway. A temporary shoofly would not be required for this alternative.

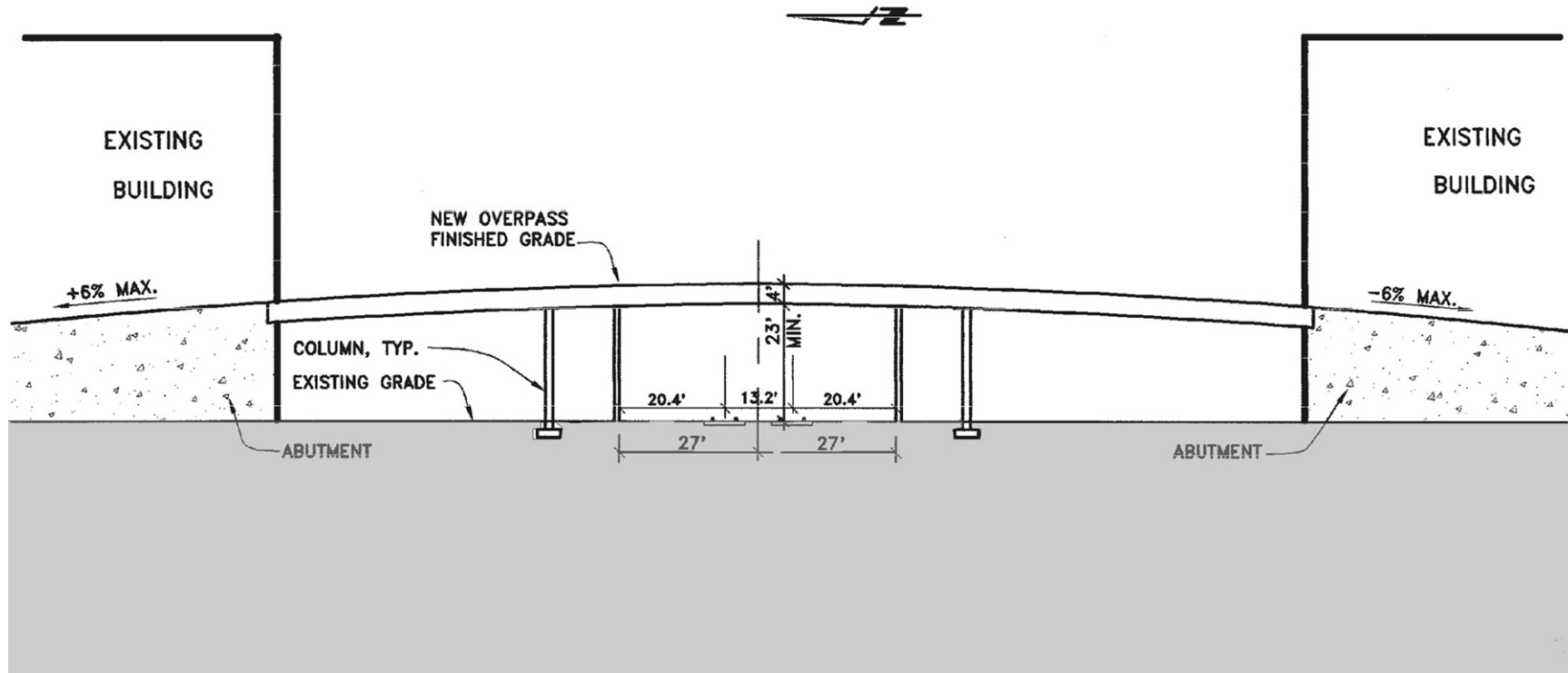
### ● **Alternative 2E: At-Grade Trainway with Overpasses & Underpasses**

This alternative (considered in [SEA 1980]) would be a hybrid of Alternatives 2C (Overpasses) and 2D (Underpasses). It would leave the existing rail corridor at-grade (as in Alternative 2C [Overpasses] and 2D [Underpasses]) and would construct a grade-separated rail corridor by means of a combination of overpasses and underpasses through the central portion of the City of Reno, at the same locations as in Alternative 2A (Depressed). For purposes of the screening evaluation, underpasses were assumed throughout the central portion of the City of Reno, except for Keystone Avenue, which would be an overpass. A temporary shoofly would not be required for this alternative.



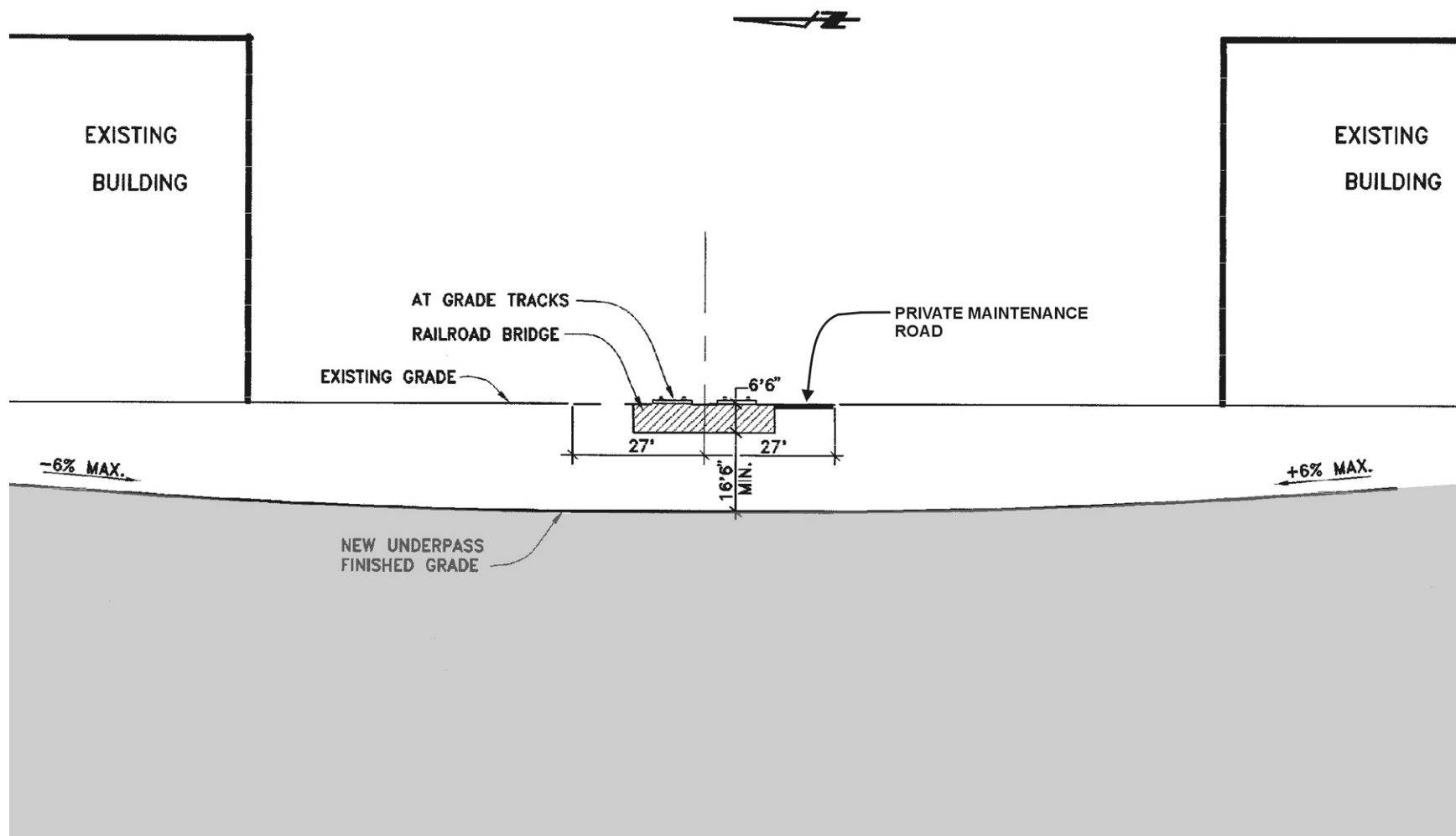
Sources: Stantec, 1999; Myra L. Frank & Associates, Inc., 2000.

**Figure 2-3: Alternative 2B – Partially Depressed Trainway  
(Typical Cross Section)**



Sources: Stantec, 1999; Myra L. Frank & Associates, Inc., 2000.

**Figure 2-4: Alternative 2C – At-Grade Trainway with Overpasses  
(Typical Cross Section)**



Sources: Stantec, 1999; Myra L. Frank & Associates, Inc., 2000.

**Figure 2-5: Alternative 2D – At-Grade Trainway with Underpasses  
(Typical Cross Section)**

### ● **Alternative 2F: Elevated Trainway**

This alternative (considered in [SEA 1980] and suggested again during the scoping period) would construct a fully grade-separated elevated trainway through the central portion of the City of Reno. The elevated trainway would be supported on a combination of earth embankments, mechanically stabilized earth (MSE) walls, and viaduct structures, as illustrated on Figure 2-6. Beginning at approximately Stoker Street, openings would be provided for Keystone Avenue and Vine Street to pass beneath the trainway on embankment. The viaduct structure would provide openings for the intersecting local surface streets crossing beneath the trainway (Washington Street, Ralston Street, Arlington Avenue, Sierra Street, Virginia Street, Center Street, Lake Street, and Evans Avenue). From the vicinity of the Rusty Spike substation, the trainway would be a combination earth-retained/MSE wall system, transitioning to an earth embankment. At approximately 800 feet west of Sutro Street, the trainway would come back down to grade to meet the existing rail line.

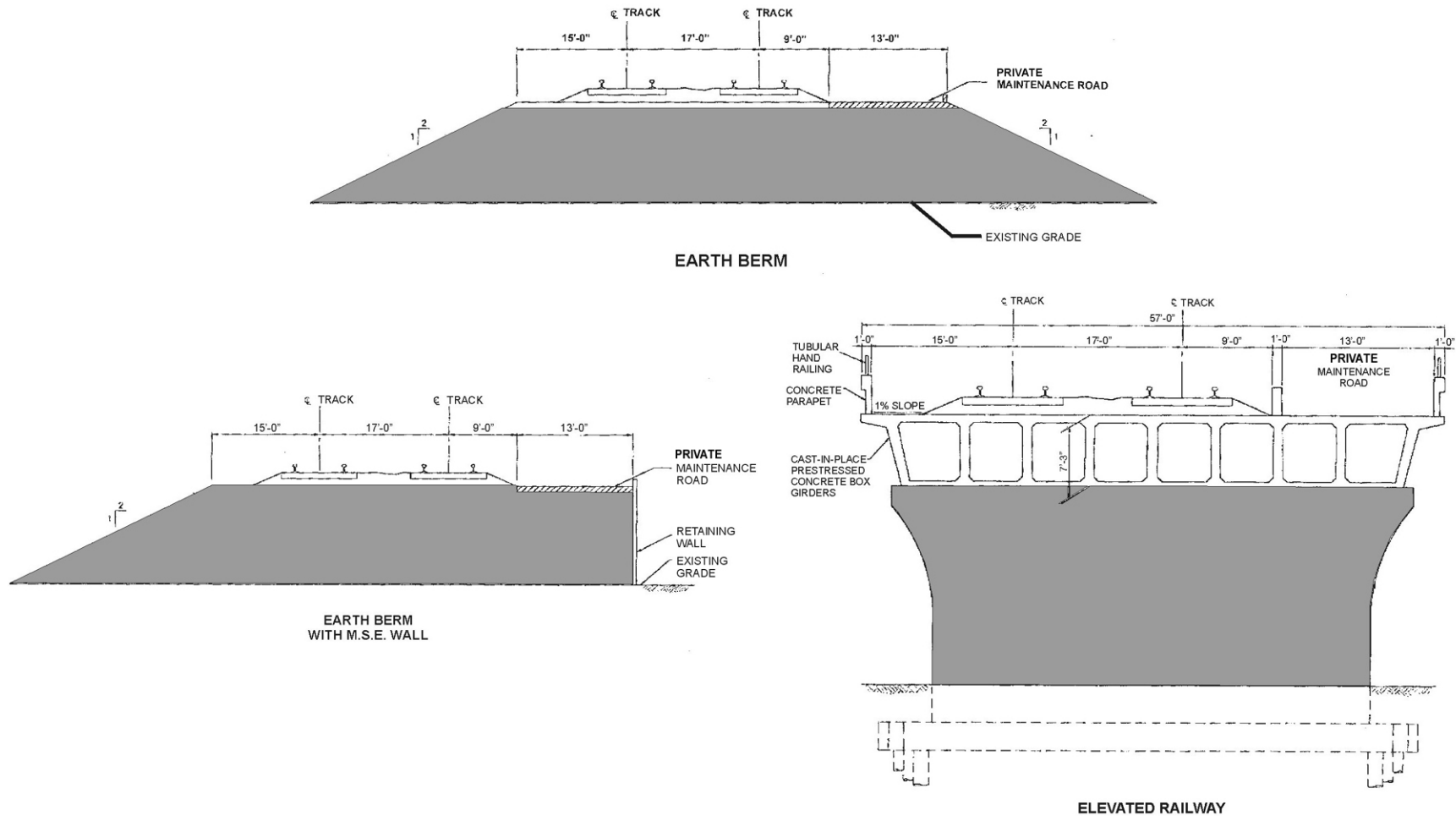
Where streets cross beneath the elevated trainway, a required vertical clearance of 16' 6" would be provided. Also required under this alternative (because the trainway elevation would produce conflicts) would be removal of two skyways currently spanning the railroad, a parking garage, and reconstruction of the existing Wells Avenue bridge over the trainway and Truckee River. A temporary shoofly would be required for this alternative.

### ● **Alternative 2G: Partially Elevated Trainway**

This alternative (considered in [SEA 1980]) would construct a fully grade-separated elevated trainway through the central portion of the City of Reno at an estimated height of 10 feet, coupled with a lowering of the intersecting street system via underpasses, resulting in a vertical clearance of 16' 6" beneath the trainway to the street system. This alternative is a hybrid of Alternatives 2D (Underpasses) and 2F (Elevated). It was proposed as a way of achieving full grade separation without a full height elevated trainway, thereby lessening the visual change that would occur with an elevated trainway. This alternative would require underpasses for the local street system, at the same locations as in all other alternatives. A temporary shoofly would be required for this alternative.

### ● **Alternative 2H: Trainway in Tunnel**

This alternative (suggested during the scoping period) would construct a two-track trainway in a tunnel of approximately 3,200 feet in length through the central portion of the City of Reno, on a horizontal alignment generally beneath the existing rail line, from a point approximately 250 feet west of Arlington Avenue to a point approximately 700 feet east of Evans Avenue. From these two tunnel termini, trains would be brought back up to grade at a nominal 1-percent grade within depressed trainway approaches. The western approach would extend westward until the vicinity of West McCarran Boulevard (approximately 2.4 miles from the western tunnel terminus). The eastern approach would extend eastward until the vicinity of I-580 (approximately 0.9 miles east



Sources: Stantec, 1999; Myra L. Frank & Associates, Inc., 2000.

**Figure 2-6: Alternatives 2F & 2G – Elevated Trainway  
(Typical Cross Sections)**

of the eastern tunnel terminus). Altogether, the total length of this alternative is estimated to be 3.9 miles.

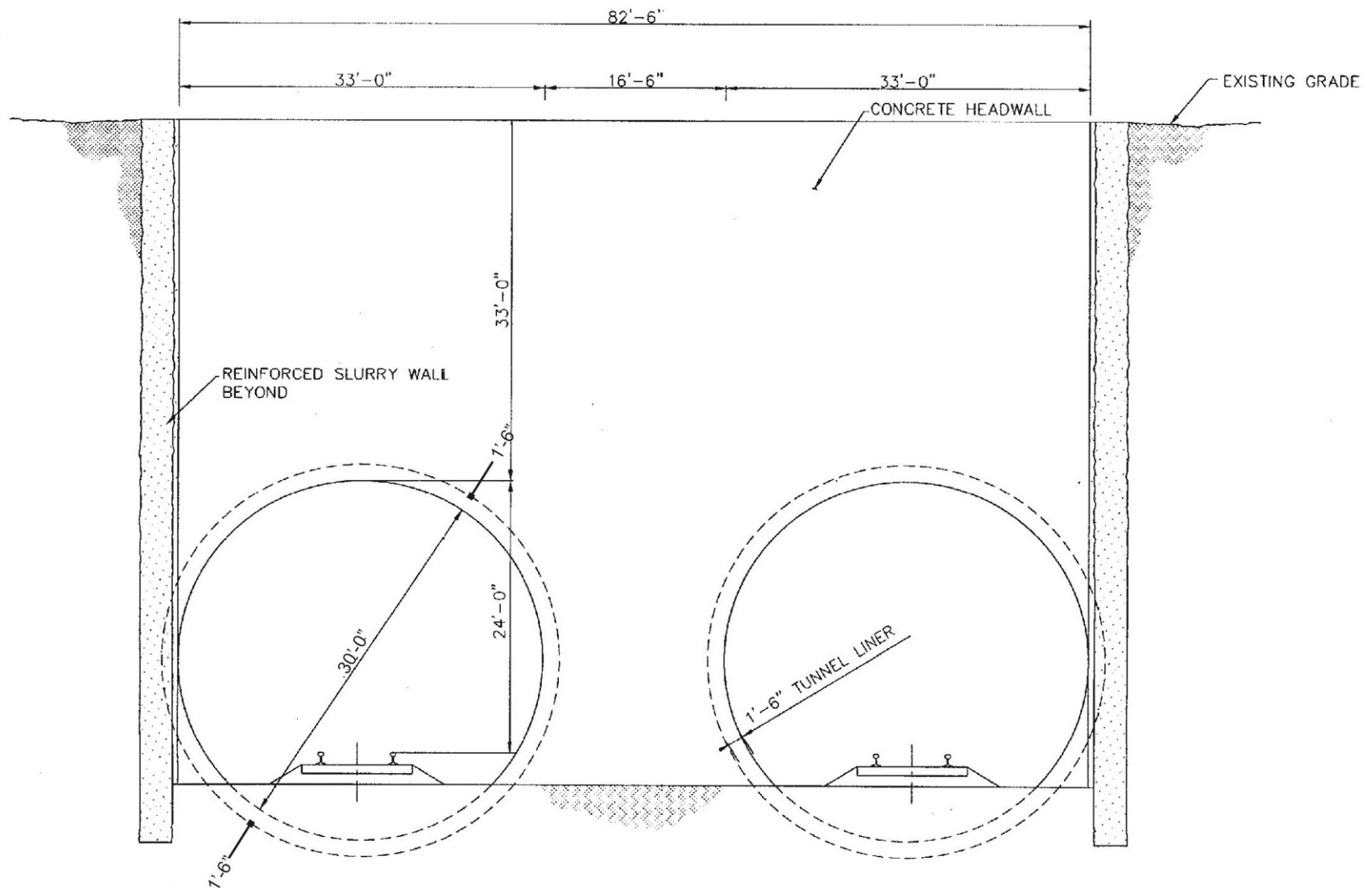
The tunnel could be constructed using one of two methods. In the first (conventional tunneling) method (referred to as Alternative 2H1 [Bored Tunnel]), twin bores accommodating one train in each direction of travel would be driven beneath the existing main line using conventional tunnel construction techniques (see Figure 2-7). It is estimated that the inside diameter of the finished tunnel would need to be 30 feet to allow for appropriate freight train clearances. Adding an area of 18 inches for the lining thickness and overcut, the excavated diameter would be approximately 33 feet. Assuming standard tunneling construction methods and taking into account the known soil and groundwater conditions in the study area, a depth of one tunnel diameter (33 feet) from the grade above is currently recommended. This would place the level of the tracks in the tunnel at a depth of approximately 57 feet below grade. One tunnel would be required for each direction of travel, and with a typical horizontal separation distance (referred to as the “ground pillar width”) of one tunnel diameter, the total horizontal dimension of the two-tunnel configuration would then be approximately 100 feet, which would exceed the width of the available existing right-of-way (54 feet). A private maintenance way was not included in this alternative in order to provide for the smallest tunnel bore possible.

A second method of construction (shown in Figure 2-8), would be constructed using a “cover-and-cut” technique (referred to as Alternative 2H2 [Cover-and-Cut Tunnel]). In this method, vertical slurry walls would first be placed along the outer edges for the length of the tunnel. A structural horizontal cover would be constructed over a portion of the tunnel and existing freight activity would be shifted on this cover. The remainder of the cover could then be placed, after which the tunnel could then be excavated beneath. Freight activity would then be permanently moved to the new below grade tunnel. This approach would make it possible to avoid a temporary shoofly in the downtown core. It would place the tunnel at a depth below grade only slightly lower than the depressed trainway (Alternative 2A). The finished tunnel could be confined to the available existing right-of-way.

Both the bored and cover-and-cut tunnels would likely require the installation of ventilation equipment in the tunnel to eliminate hazards from diesel exhaust. During construction, short shooflies would need to be constructed at either end of the tunnel to temporarily divert trains while the tunnel portals are connected to the main line track. Under either of the tunnel alternatives, a substantial portion of the existing street system in the downtown core (from Arlington Avenue to Evans Avenue) could remain unaffected during the construction period.

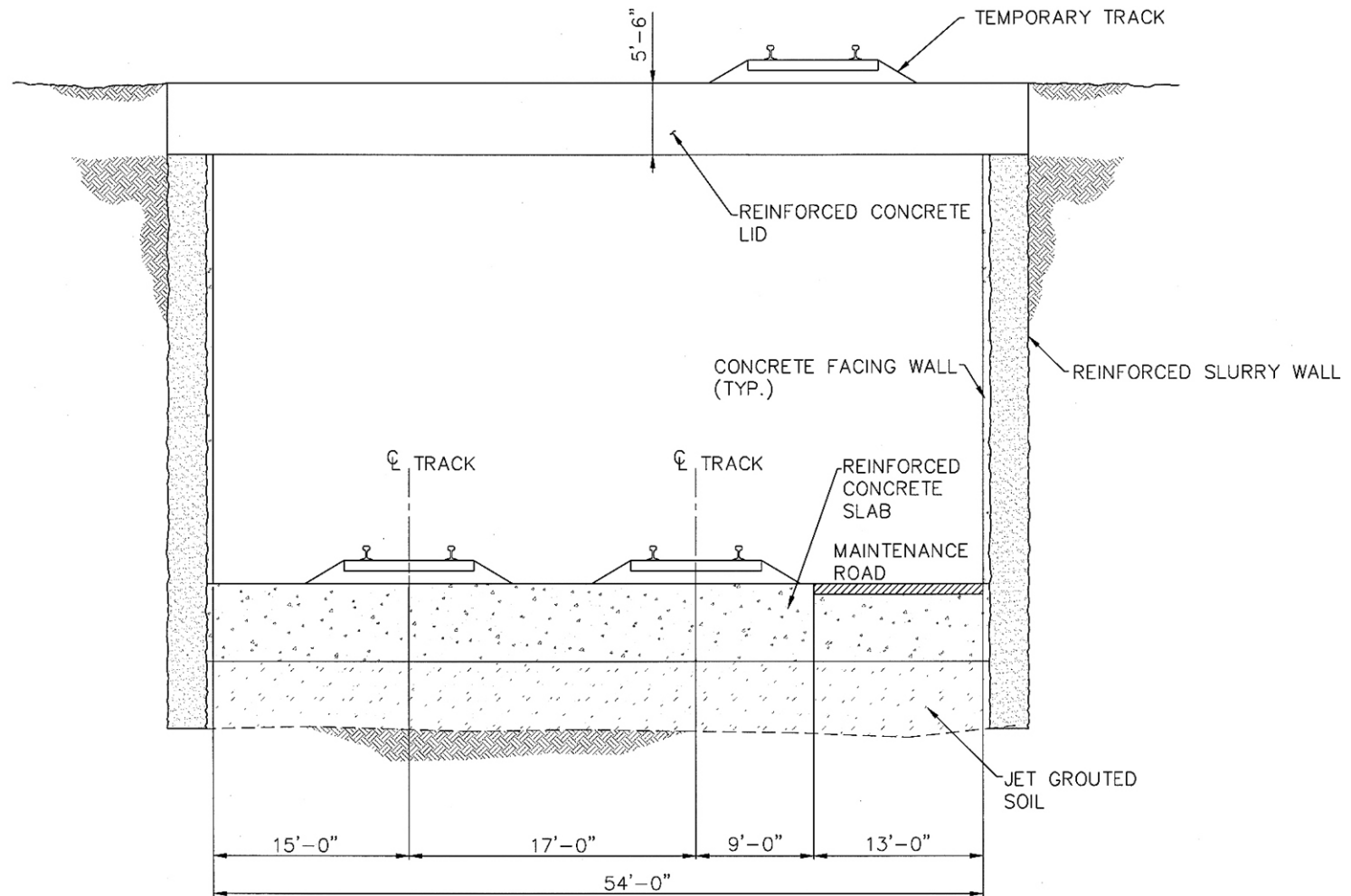
### ● **Alternative 2I: Minimum Grade Separation Alternative**

This alternative (considered in [Nolte (b)1996]) would leave the existing rail line at-grade and construct grade separations via underpasses at four locations: Keystone Avenue, Washington Street, Arlington Avenue, and Evans Avenue. One-way couplets would be used to provide traffic circulation. In addition, some streets could be considered for closure, including Vine Street, Ralston Street and Washington Street. In all other respects, this alternative would be similar to Alternative 2D (Underpasses). This alternative would require a temporary shoofly at each of the four underpass locations.



Sources: Nolte & Associates, 1999; Myra L. Frank & Associates, Inc., 2000.

**Figure 2-7: Alternative 2H1 – Bored Tunnel Alternative  
(Typical Cross Section)**



**54' COVER AND CUT TUNNEL ALTERNATIVE**

N.T.S.

Sources: Nolte & Associates, 1999; Myra L. Frank & Associates, Inc., 2000.

**Figure 2-8 : Alternative 2H2 – Cover and Cut Tunnel  
(Typical Cross Section)**

## **2-3 BUILD ALTERNATIVES ALONG OTHER ALIGNMENTS**

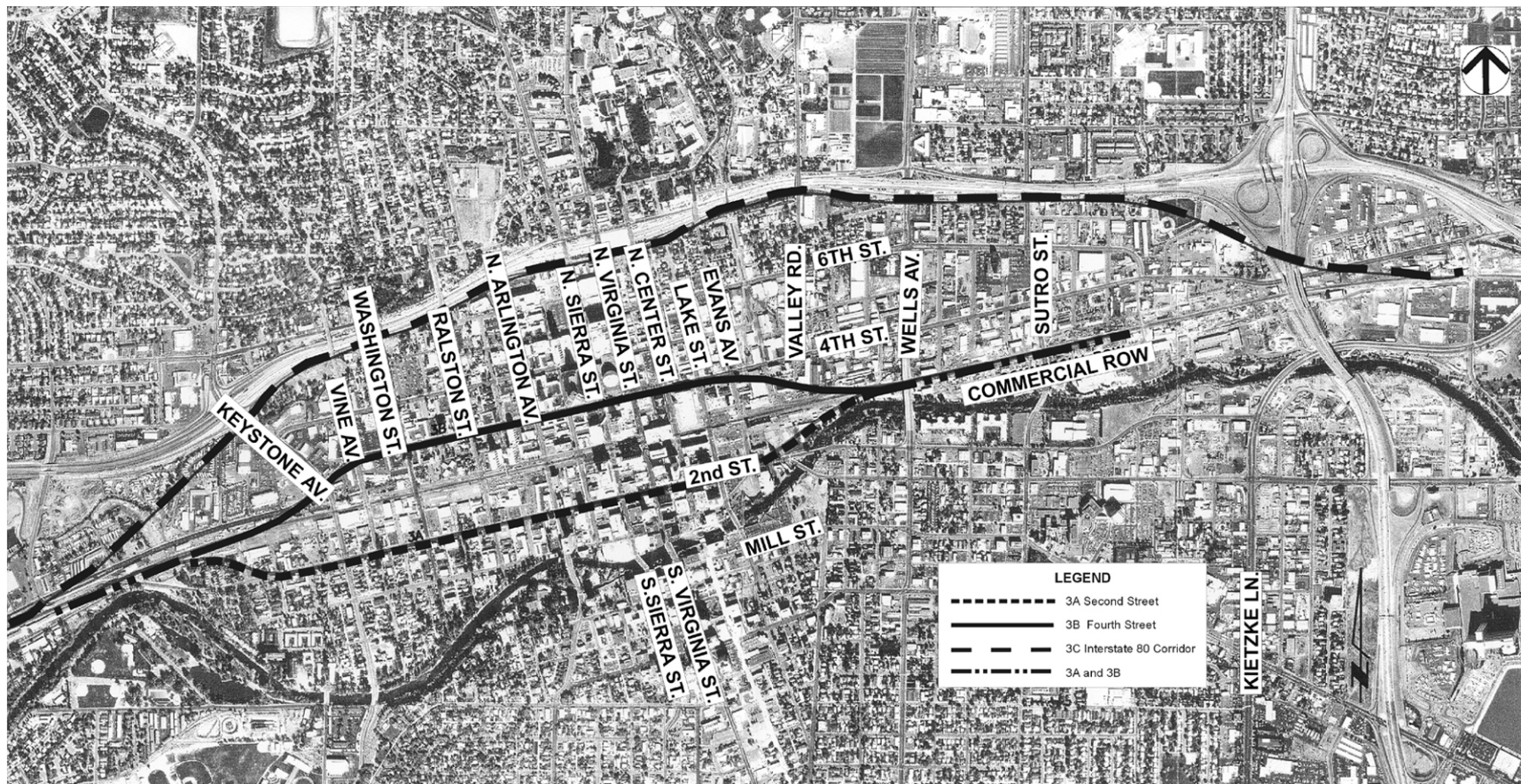
The following alternative alignments have been suggested for the Reno Railroad Corridor.

### **● Alternative 3A: Second Street**

This alternative would relocate the existing double-track main rail line to Second Street, from approximately West Second Street to the vicinity of Wells Avenue (see Figure 2-9). The alignment would leave the existing rail line at the West Second Street underpass, and transition across existing private property to the southeast to join West Second Street at approximately Arletta Street. The alignment would then follow West Second Street eastward until Evans Avenue and transition across existing private property to the northeast, to rejoin the existing rail line just prior to passing beneath Wells Avenue. The railroad facility could theoretically be constructed as an at-grade, depressed, or elevated trainway. A typical at-grade section is shown on Figure 2-10. A typical elevated section would be similar to that shown on Figure 2-6. The intersecting street system would need to be separated from the trainway by means of at-grade bridges (for the depressed trainway configuration), overpasses or underpasses (for the at-grade configuration), or remain at-grade (for the elevated configuration). A temporary shoofly would be needed at both the west and east ends of this alternative, for a short distance, but the majority of the existing main line could remain in use during the construction period.

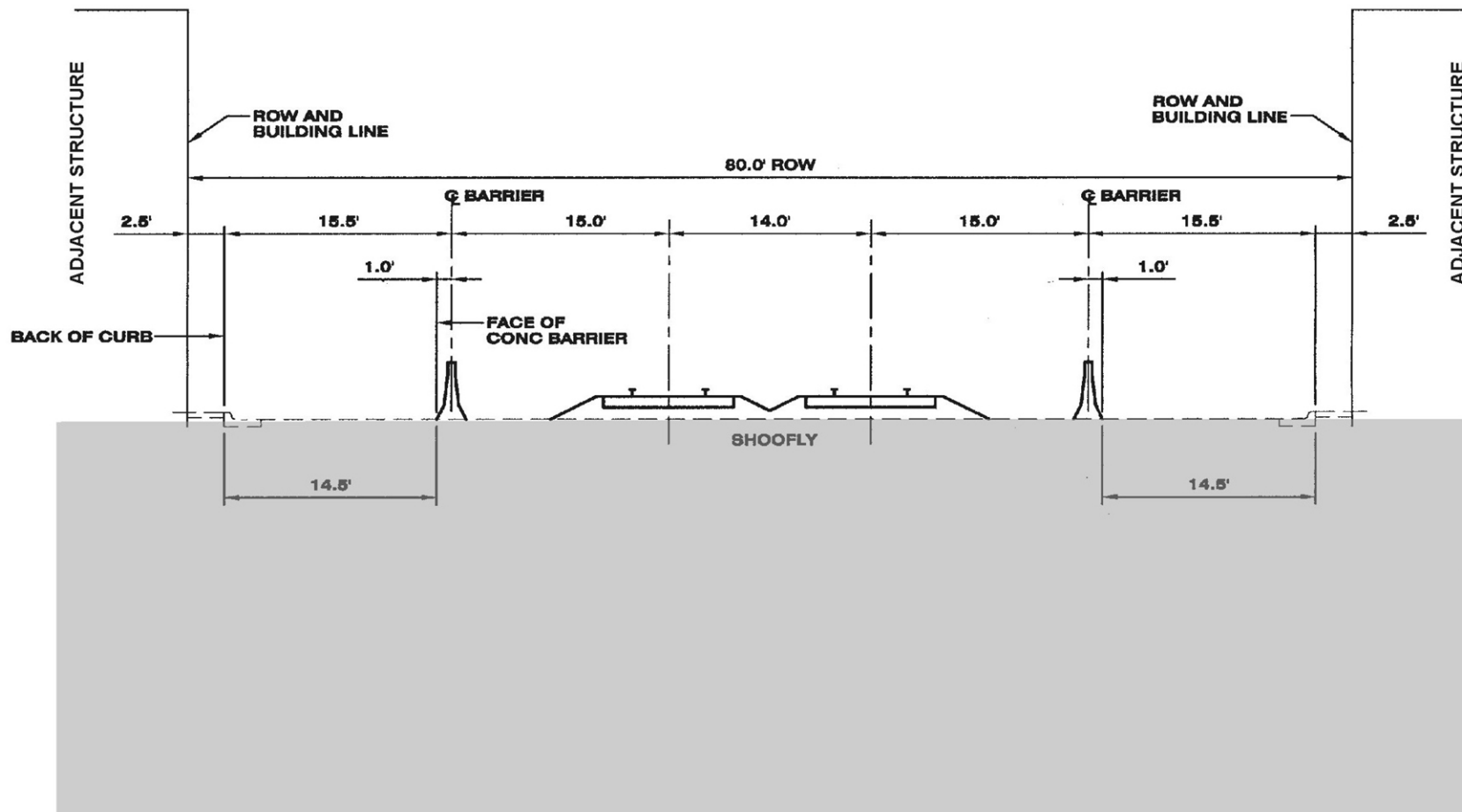
### **● Alternative 3B: Fourth Street**

This alternative would relocate the existing rail line to Fourth Street, from approximately West Second Street to the vicinity of Wells Avenue (see Figure 2-9). The alignment would leave the existing rail line at a point west of Keystone Avenue and follow Fourth Street easterly until Evans Avenue, where it would transition to the southeast across private property to rejoin the existing rail line just prior to passing beneath Wells Avenue. The railroad facility could theoretically be constructed as an at-grade or depressed trainway. A typical at-grade section is shown on Figure 2-10. The intersecting street system would need to be separated from the trainway by means of at-grade bridges (for the depressed trainway configuration), overpasses or underpasses, or remain at-grade (for the elevated configuration). A temporary shoofly would be needed at both the west and east ends of this alternative, for a short distance, but the majority of the existing main line could remain in use during the construction period.



Sources: Stantec, 1999; Myra L. Frank & Associates, Inc., 2000.

**Figure 2-9: Alternatives 3A, 3B & 3C – Location of Alignments**



Sources: HDR, 1999; Myra L. Frank & Associates, Inc., 2000.

**Figure 2-10: Alternatives 3A & 3B – Typical At-Grade Cross Section**

### ● **Alternative 3C: Interstate 80 (I-80) Corridor**

This alternative (considered in [Nolte (b)] 1996) would relocate the existing rail line to a new corridor generally located along the south side of I-80 for a distance of approximately 3.1 miles, extending from the vicinity of Stoker Avenue and West Second Street on the west to near Galletti Way on the east. This alternative would also pass beneath I-580 (formerly US-395) in an existing opening. Maintenance way access would be provided at nine locations along a continuous parallel road. The alignment is shown on Figure 2-9.

The new corridor would be a combination of at-grade, open-walled trenches, and tunnel sections. Approximately 1.7 miles (or about 56 percent) of the alignment would be either at-grade or open trench sections. Approximately 1.2 miles (or about 38 percent) of the alignment would be in tunnel sections. The remainder (0.2 miles; about 6 percent) would be railroad underpass structures passing beneath existing streets. Grade separations of the roadway system would occur at West Second Street, West Fourth Street, Keystone Avenue, Vine Street, Washington Street, Ralston Avenue, Sierra Street, Virginia Street, Center Street, Evans Avenue, Valley Road (and a nearby crossing of the UPRR North Reno Branch), Wells Avenue, Sutro Street, and East Fourth Street. All would be overpasses except for West Second and East Fourth Streets, which would be underpasses.

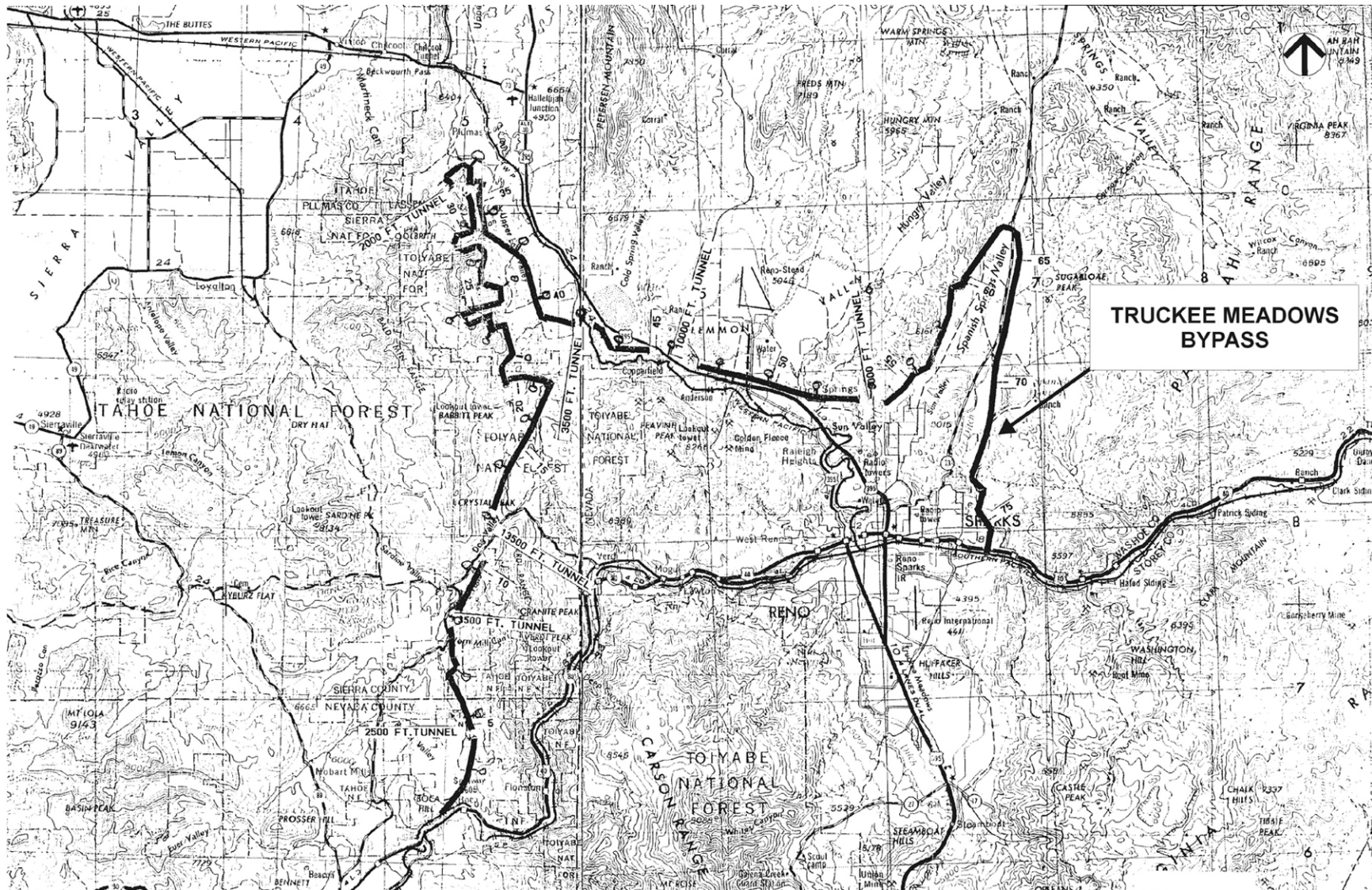
A temporary shoofly would not be needed for this alternative, except at the west and east ends of the corridor for the period of time needed to transition permanent rail service to the completed project.

### ● **Alternative 3D: Truckee Meadows Bypass**

This alternative (suggested in [Nolte (b)] 1996) would remove main line rail service from the Truckee Meadows area entirely, beginning at Boca, California and extending north of the City of Reno area until east of the Truckee Meadows, rejoining the main line at Sparks (see Figure 2-11), for a total alignment length of 78 miles. Extensive amounts of new construction would be needed for this alternative, including 78 miles of double track main line, 58 bridges (17,400 lineal feet), and 7 tunnels (2 single track bores; 76,000 lineal feet). The new alignment would pass through nearly 18 miles of National Forest and 3,800 acres of new right-of-way would be required.

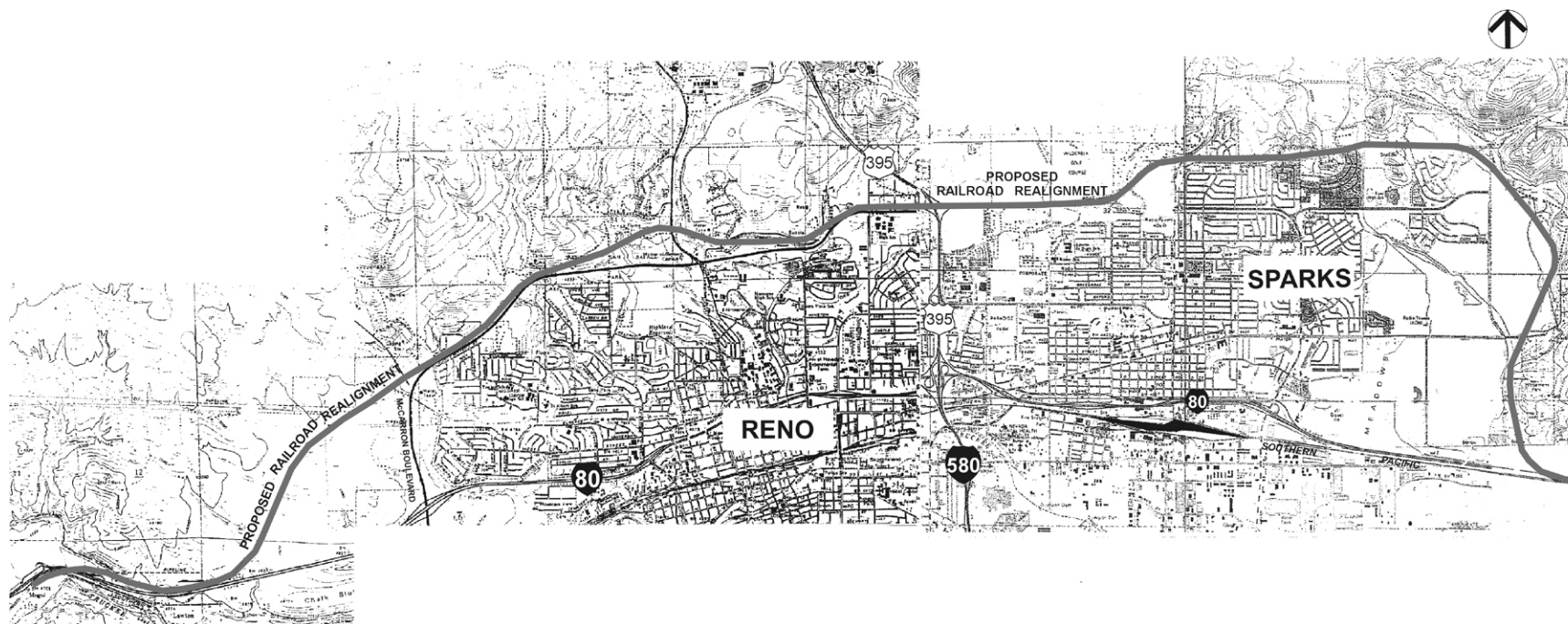
### ● **Alternative 3E: North McCarran Boulevard Corridor**

This alternative (suggested in [Nolte (b)] 1996) would follow an alignment in the vicinity of North McCarran Boulevard, located north of the University of Nevada Reno (see Figure 2-12). This alternative would be an estimated 15 miles in length and requires that substantial portions of its length be in deep cuts or in tunnel.



Sources: UPRR, 1996; Myra L. Frank & Associates, Inc., 2000.

**Figure 2-11: Alternative 3D – Truckee Meadows Bypass**



Sources: Nolte & Associates, 1999; Myra L. Frank & Associates, Inc., 2000.

**Figure 2-12: Alternative 3E – North McCarran Boulevard Corridor**

## **2-4 TEMPORARY SHOOFLY ALTERNATIVES**

Most of the Reno Railroad Corridor alternatives discussed in the previous sections would require the use of a temporary shoofly for daily rail operations during the construction period. Each of the shoofly alternatives located within the central portion of the City of Reno would operate at-grade and therefore would have at-grade crossings (minor alterations to street elevation at some crossings may be necessary) at all streets that intersect with the shoofly. Each at-grade crossing would have barriers, warning lights, horns, or other such devices to maintain appropriate levels of vehicular and pedestrian safety during the construction period, in addition to traffic signalization. Several alternative locations for the shoofly have been suggested. Each of these locations could theoretically be used in conjunction with one or more of the Reno Railroad Corridor alternatives described previously. Alternatives 4A (Commercial Row Shoofly), 4B (Second Street Shoofly), 4C (Fourth Street Shoofly), 4D (Third Street Shoofly), and 4F (Temporary Tunnel) are illustrated on Figure 2-13. Alternative 4E (Feather River Shoofly) is shown on Figure 2-14.

### **● Alternative 4A: Commercial Row Shoofly**

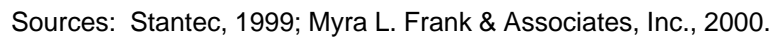
This alternative would construct the shoofly along the south side of the UPRR main line, between West Second Street on the west and Sutro Street on the east, using Commercial Row as the shoofly alignment through the downtown core. East of the downtown core the shoofly would follow an alignment adjacent to and south of the main line in areas that are generally undeveloped or industrial in use. West of the downtown core the shoofly would follow an alignment through open parking lots and along an alleyway between Second Street and Commercial Row. The shoofly would be constructed at-grade and would be removed when the reconstructed main line is opened for service. The shoofly would have two tracks east and west of the downtown core, but only one track in the downtown core itself due to right-of-way constraints.

### **● Alternative 4B: Second Street Shoofly**

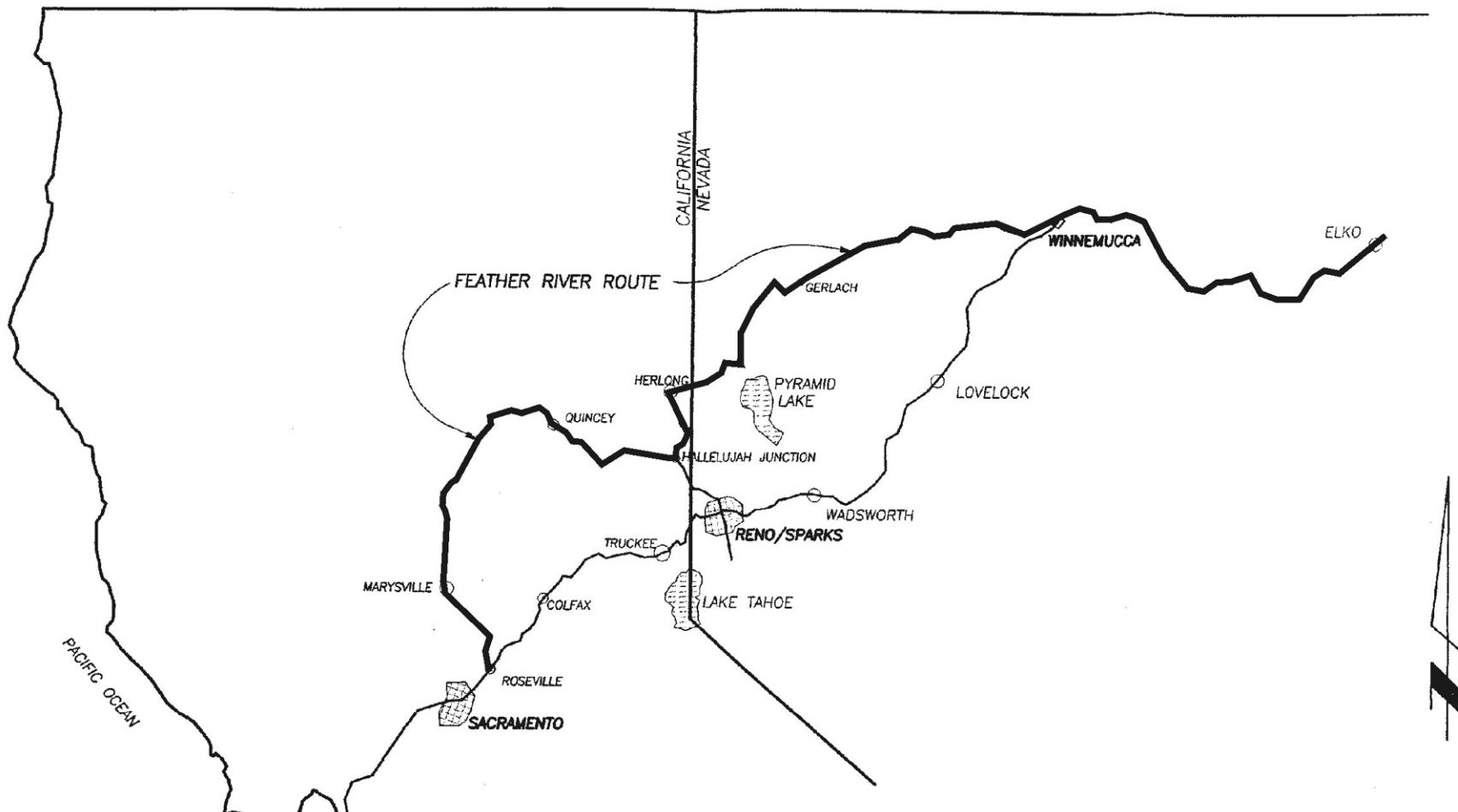
This alternative would construct the temporary shoofly commencing west of the UPRR crossing over West Second Street and following Second Street to approximately Evans Avenue and then following along the south side of the UPRR tracks along the undeveloped area to the east end of the corridor near Sutro Street. The alignment is similar to that proposed as a permanent corridor along Second Street.

### **● Alternative 4C: Fourth Street Shoofly**

This alternative would construct the temporary shoofly within Fourth Street in the same general reach as the Commercial Row Alternative.



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Sources: HDR, 1999; Myra L. Frank & Associates, Inc., 2000.

**Figure 2-14: Alternative 4E – Feather River Route  
Shoofly Alternative**

### ● **Alternative 4D: Third Street Shoofly**

This alternative would construct the temporary shoofly within Third Street in the same general reach as the Commercial Row Alternative.

### ● **Alternative 4E: Feather River Route Shoofly**

This alternative (considered in [Nolte (b)] 1996) and suggested again during the scoping period) would relocate rail service to the existing UPRR Feather River route (see Figure 2-14) during the construction period. This route is approximately 389 miles in length. It would essentially reroute existing freight traffic around the City of Reno, leaving Roseville, California; proceeding north to Quincy, Halleulujah Junction and Herlong, cross into Nevada and continue northeast to Gerlach connecting again with the main line in Winnemucca.

### ● **Alternative 4F: Temporary Tunnel Shoofly**

This alternative (suggested during the scoping period) would construct a tunnel generally beneath the existing rail line for use during the construction period. West of the downtown core the shoofly would follow an alignment through open parking lots and along an alleyway between Second Street and the south side of the UPRR tracks. The tunnel would be abandoned after construction of the main line improvements have been completed.

## **2-5 ALTERNATIVES SCREENING PROCESS**

### **2-5.1 Screening Criteria**

In order to evaluate the various alternatives for the Reno Railroad Corridor, screening criteria were derived from the Statement of Purpose and Need. The criteria were reviewed by the PDT and several were determined to be “critical.” A “critical screening criterion” is defined as:

“a criterion, that if not met, will lead to the selection of the no-action alternative.”

(FHWA Memorandum, *“Purpose and Need” in Environmental Documents*; dated September 18, 1990).

The alternatives screening process focused on these critical screening criteria, leading to a set of recommended alternatives for subsequent documentation in the EIS.

### **2-5.2 Methods of Assessment**

The following are the methods that were used to assess the performance of the alternatives against the critical screening criteria.

● **Critical Screening Criterion 1: Eliminate Grade Crossings**

One of the primary objectives of the Reno Railroad Corridor is to reduce delays associated with at-grade trains passing through the central portion of the City of Reno. This criterion was assessed in terms of the number of grade crossings in the central portion of the City of Reno that would be eliminated by a given alternative.

● **Critical Screening Criterion 2: Improve Circulation**

A screenline traffic analysis was used to estimate the effect of the various alternatives on traffic capacity in the central portion of the City of Reno. Also, estimates of vehicle hours of delay were used to measure the performance of the alternatives, using data developed in a number of previous studies.

● **Critical Screening Criterion 3: Improve Public Safety**

Existing at-grade freight train movements through the central portion of the City of Reno expose the public to safety hazards, including accidents involving vehicles, pedestrians, or bicycles; or hazards associated with rail derailments, potentially causing accidents and/or releases of hazardous substances into the surrounding environment. Also related to this screening criterion would be potential effects on the delivery of emergency services throughout the central portion of the City of Reno. This criterion was assessed on a qualitative basis.

● **Critical Screening Criterion 4: Continued Freight Service**

An important segment of the economy in the City of Reno region is related to freight goods movement, warehousing and distribution. A given alternative may produce a benefit or a detriment to the ability of the region to continue to attract and hold this important function. Freight rail mileage was used as a surrogate for travel time by the railroad to traverse the area. In addition, a qualitative assessment of functional effects on the rail industry was also used in the screening evaluation.

● **Critical Screening Criterion 5: Economic Development**

Currently, freight trains operating on the existing rail line affect the central portion of the City of Reno (and the downtown core, in particular) in several ways that work to the detriment of the local economy. Freight trains are not attractive; they produce noise and vibration that disturb residents and hotel occupants; they affect (at least temporarily) access to business establishments on either side of the main line tracks; and they exist along a corridor which would otherwise offer the potential for further economic growth. This screening criterion was measured in terms of the following factors: (a) the ability to enhance economic benefits to the City of Reno (including the ability to control and market a portion of future air rights in the downtown core), (b) adverse effects of noise on residents and hotel occupants (primarily sleep disruption), (c)

aesthetics, and (d) patron access to downtown businesses. These factors were all evaluated qualitatively.

### ● **Critical Screening Criterion 6: Maintain Amtrak Service**

Currently, passenger rail service is provided to the downtown core via two Amtrak trains per day. The historic Southern Pacific Depot, located on Commercial Row between Center and Lake Streets, is being used as the passenger terminal. The Federal Railroad Administration and National Association of Railroad Passengers are on record in favor of maintaining passenger service to the existing station and the National Railroad Passenger Corporation (Amtrak) has stated that its needs in continuing passenger service to the City of Reno should be accommodated in some way. This screening criterion was assessed qualitatively.

### ● **Critical Screening Criterion 7: Reasonable Cost**

The City of Reno, in cooperation with the UPRR, has assembled a financial package that would permit the implementation of a project emerging from the Reno Railroad Corridor EIS/Preliminary Engineering (PE) process in the range of \$200 million (in year 2000 dollars). For purposes of the screening evaluation, a capital cost in excess of double this amount (or approximately \$400 million, in 2000 dollars) was deemed to be outside the range of reasonableness. This screening criterion was measured in terms of estimated capital cost.

### ● **Critical Screening Criterion 8: Engineering Reasonableness**

Existing geotechnical conditions in the central portion of the City of Reno require that construction methods be selected carefully, to ensure that a project emerging from the EIS/PE process can be built with a satisfactory amount of risk. In addition, most of the area subject to construction is also within the economic center of the City of Reno and therefore potential disruption to business activity is also of paramount concern. This screening criterion is aimed at selecting an alternative that uses engineering design that will provide assurance of a high likelihood of project implementation success and that has construction methods resulting in an acceptable level of risk to the surrounding area and its current occupants, including both the local business interests and the operating railroad. This screening criterion was measured qualitatively.

Table 2-1 summarizes the criteria derived from the Statement of Purpose and Need, and identifies which of those criteria were considered “critical.”

**Table 2-1: Reno Railroad Corridor Alternatives Screening Criteria**

	Screening Criteria	Critical Project Element
1	Eliminate grade crossings in the central portion of the City of Reno.	Yes
2	Improve vehicular, pedestrian, and bicycle circulation through the central portion of the City of Reno.	Yes
3	Improve public safety by reducing vehicular/pedestrian/railroad conflicts and hazards associated with rail derailments, and improve access for public and emergency services.	Yes
4	Continue freight service to the City of Reno.	Yes
5	Promote economic development in the City of Reno.	Yes
6	Maintain Amtrak passenger service to the City of Reno downtown.	Yes
7	Develop a project with reasonable cost in comparison to other alternatives.	Yes
8	Develop a feasible project, using engineering, design, and construction methods that have a high probability of reliability and success, and involve acceptable risks.	Yes
9	Reduce noise and vibration affecting residents and visitors.	No
10	Reduce air emissions from locomotives and idling motor vehicles in the central portion of the City of Reno.	No

Source: Nolte Team, 1999.

### 2-5.3 Results of the Screening Process

The following are the results of the screening process. Failure of at least one critical screening criterion was determined to be sufficient grounds for rejecting an alternative from further consideration.

#### ● Criterion 1: Eliminate Grade Crossings

Table 2-2 shows the number of existing grade crossings that would be eliminated under the various alternatives.

**Table 2-2: Existing Grade Crossings Eliminated Under Reno Railroad Corridor Alternatives**

Alternative	Description	Grade Crossings Eliminated
1	No Build	0
<b>Alternatives Along the Existing Alignment</b>		
2A	Depressed Trainway	12
2B	Partially Depressed Trainway	12
2C	At-Grade Trainway With Overpasses	12
2D	At-Grade Trainway With Underpasses	12
2E	At-Grade Trainway With Overpasses and Underpasses	12
2F	Completely Elevated Trainway <sup>1</sup>	10
2G	Partially Elevated Trainway	10
2H1	Trainway in Conventional Tunnel	12
2H2	Trainway in Cover-and-Cut Tunnel	12
2I	Short Term Grade Separations	4
<b>Alternatives Along Other Alignments</b>		
3A	Second Street	12
3B	Fourth Street	12
3C	I-80 Corridor <sup>2</sup>	13
3D	Truckee Meadows Bypass <sup>3</sup>	20
3E	No. McCarran Boulevard Corridor <sup>4</sup>	16
<b>Temporary Shoofly Alternatives<sup>5</sup></b>		
4A	Commercial Row	NA
4B	Second Street	NA
4C	Third Street	NA
4D	Fourth Street	NA
4E	Feather River Route	NA
4F	Temporary Tunnel	NA

Note:

<sup>1</sup>The existing Wells Avenue and West Second Street grade separations would be eliminated under this alternative.

<sup>2</sup>Includes Sage St.

<sup>3</sup>Includes 6 additional crossings to the west: Crystal Park Rd., Bridge St., Mogul Rd. West, Mogul Rd. East, Woodland Ave., Del Curto Dr. Includes two additional crossings to the east: Sage St. and Galletti Way.

<sup>4</sup>Includes 2 additional crossings to the west: Woodland Ave. and Del Curto Dr. Includes two additional crossings to the east: Sage St. and Galletti Way.

<sup>5</sup>None of the shoofly alternatives require a permanent grade separation.

Source: Nolte Team, 1999.

The No Build Alternative would not eliminate any existing grade crossings in the central portion of the City of Reno.

Of the build alternatives, most of the alternatives would eliminate a comparable number of existing grade crossings, with several exceptions. Both the Truckee Meadows Bypass and North McCarran Boulevard Corridor alternatives would result in more grade separations than would occur under the other build alternatives, 20 and 16, respectively, but in both cases it is assumed that the existing main line through the central portion of the City of Reno would be abandoned, thereby permitting the 12 street crossings previously identified to also be counted.

Alternative 2I (Minimum Grade Separation) would result in far fewer grade separations than the remaining build alternatives and therefore was judged to fail this screening criterion.

With the exception of Alternative 2I (Minimum Grade Separation), all other alternatives on the existing alignment and all alternatives on other alignments were judged to satisfy this criterion.

It should be noted that the above findings are predicated on the engineering feasibility of these alternatives. See also the discussion under that criterion.

This criterion was not applicable to Alternatives 4A (Commercial Row Shoofly) through 4F (Temporary Tunnel).

## ● **Criterion 2: Improve Circulation**

A screenline traffic analysis was conducted (Hexagon 1999) based on year 2030 traffic forecasts from the Regional Transportation Commission (RTC) travel demand model for the City of Reno area. The analysis shows that the highest demand occurs in the northbound direction during the PM peak hour, in which approximately 10,600 vehicles per hour (in the prevailing direction) need to be served.

Roadways in the central portion of the City of Reno provide varying capacities: 650 vehicles per lane per hour (vplph) for minor roadways such as Vine, Washington and Ralston; 850 vplph for arterials such as Arlington, Sierra and Center; and 1,000 vplph for Virginia Street. The total available capacity through the central portion of the City of Reno, using these figures, would then be 16,300 vehicles per hour (vph).

Table 2-3 provides definitions of highway levels of service used to estimate intersection performance.

Based upon the capacities stated above, and assuming year 2030 traffic demand, intersections in the central portion of the City of Reno are expected to operate at level of service (LOS) B in the northbound direction during the PM peak hour. LOS B would provide 11,400 vph in the northbound direction in the PM peak hour. This is approximately 800 vph greater than the northbound peak demand estimate. This suggests that one lane in the northbound direction, with a capacity of 650 vplph, from one minor arterial, could be eliminated without resulting in a reduction in the projected peak hour LOS (or, taking into account both directions of travel, one minor two-lane street could be eliminated and the resulting throughput capacity would not diminish the LOS in the central portion of the City of Reno below a value of B, in the year 2030).

**Table 2-3: Level of Service Definitions**

Level of Service	Volume/Capacity Ratio	Interpretation
A	00.0-0.60	Low volumes; primarily free flow
B	0.61-0.70	Stable flow with some restrictions
C	0.71-0.80	Stable operations, but ability to move is more restricted.
D	0.81-0.90	Approaching unstable flow.
E	0.91-1.00	Significant approach delays and substantially reduced speeds.
F	over 1.00	Reduced flow operations with high approach delays and low speeds.

Source: Transportation Research Board, *Transportation Research Circular 212*, Interim Materials of Highway Capacity, January 1980.

In addition to the level of service calculations, estimates were derived for daily vehicle hours of delay eliminated using the data presented in *UP/SP Railroad Merger Impact Analysis - Traffic/Delay Analysis Final Draft* (Meyer, Mohaddes Associates, Inc. 1997), assuming 24 freight trains per day in the year 2000.

The No Build Alternative would provide a satisfactory level of service in the central portion of the City of Reno in 2030, but would yield no improvement in daily vehicle hours of delay.

Alternative 2A (Depressed) would be satisfactory, since existing total roadway capacity would be maintained using at-grade bridges across the Reno Railroad Corridor. It would also eliminate an estimated 470 daily hours of vehicle delay.

Alternatives 2B (Partially Depressed), 2C (Overpasses), 2D (Underpasses), 2E (Over- & Underpasses), and 2G (Partially Elevated) would be satisfactory, if existing roadway capacity could be maintained across the Reno Railroad Corridor. For overpasses, underpasses, partial overpasses, and partial underpasses, a range of street cross sections is possible, from 2-lane to 4-lane structures. It is assumed that 4-lane crossings could be provided at all but one location. Under this assumption, sufficient capacity would exist for estimated traffic demand in 2030.

Whether the required street capacity can be provided is in part a function of right-of-way requirements. According to recently prepared estimates (Nolte 1998), 4-lane underpass structures could be built on 5 of the 12 central City of Reno grade crossing streets (Vine, Washington, West, Sierra and Lake) without the need for additional property acquisition. For the remaining 7 streets (Keystone, Ralston, Arlington, Virginia, Lake, Evans and Sutro), additional right-of-way would be needed between Second and Fourth Streets. Keystone Avenue would also require realignment of Fourth Street. Assuming that it would be acceptable to acquire right-of-way to this extent, and further assuming that the needed right-of-way would be similar for both overpasses and underpasses, it would be possible to construct the necessary

capacity through the central portion of the City of Reno, and therefore these alternatives would satisfy this screening criterion.

If the required right-of-way were found to be unacceptable, however, then up to 7 central City of Reno streets could be reconstructed to only 50 percent of their current capacity (2 proposed lanes as opposed to 4 existing lanes), which would result in a reduction in total corridor capacity (34 proposed lanes as compared with 48 total existing lanes) of 4,650 vph in the northbound direction in the PM peak hour. This would result in an available corridor capacity of 11,650 vph. If this total capacity must serve a year 2030 demand of 10,575 vph, then a deterioration to LOS D/E would occur, which is substantially worse than present conditions.

In addition to the throughput capacity of the north-south street system, other aspects of circulation in the downtown area were considered. Because of the compact nature of the downtown core area, circulation is limited. Major hotel properties use the street system for access by both people and vehicles. In addition, many of the businesses provide front door tour bus service and valet operations.

Access for delivery purposes is needed for nearly all of the downtown properties. Most major hotel/casino properties south of the existing railroad tracks use an alley system for back-of-the-house deliveries. Douglas Alley and Fulton Alley are examples. North of the railroad tracks, the Eldorado Hotel uses access from Third Street for back-of-the-house deliveries. This access would be severely constrained if not eliminated by full overpasses and underpasses (proposed under Alternatives 2C [Overpasses], 2D [Underpasses] and 2E [Over- & Underpasses]). Also, given the available surface level street configuration with the underpass/overpass alternatives, it is unlikely that adequate space would be available for service vehicles to negotiate the turns required to enter and exit the service alleys.

Valet and parking access would also be compromised by the underpass/overpass alternatives. The Flamingo Hilton Hotel uses Sierra Street for parking and valet service. The Eldorado Hotel uses the east side of Sierra Street for valet service and the parking garage uses the west side of Sierra Street for entry purposes (the garage exits to Third Street). Harrah's Hotel uses the east side of Center Street for valet service. The Hilton garage, located between Virginia and Center Streets, uses both Center (entry) and Plaza (exit) Streets. All of these entrances and exits would be adversely affected by the overpass/underpass configuration.

Also, the Citifare transit system uses Sierra Street, Center Street, Third Street (Virginia to Sierra) and Plaza Street (Virginia to Lake) for access to CitiCenter, the system's major hub and transfer station located between Fourth and Plaza on the west side of Center Street. Bus movements in this area would be constrained and transfer operations could be adversely affected, as well.

Due to the potentially adverse impacts on local circulation, deliveries to downtown businesses, and potential adverse effects on the Citifare bus system, Alternatives 2C (Overpasses), 2D (Underpasses), and 2E (Over- & Underpasses) were judged to fail this criterion.

The partial underpass/overpass alternatives (Alternatives 2B and 2G) would provide adequate throughput and therefore would satisfy the criterion. Each of these alternatives would result in an estimated 400 to 470 daily hours of delay eliminated.

Alternative 2F (Elevated) would permit existing grade crossings to remain at-grade, permitting sufficient traffic capacity and therefore satisfying this criterion. This alternative would also eliminate an estimated 400 to 470 hours of daily vehicle delay.

Alternative 2H (Tunnel) would permit existing roadway capacity through the central portion of the City of Reno to be maintained, because it would not require grade separation of the street system, and therefore it would satisfy this criterion. This alternative would eliminate an estimated 470 hours of daily vehicle delay.

Alternative 2I (Minimum Grade Separation) would provide existing roadway capacity through the central portion of the City of Reno, assuming existing capacity could be maintained at the 4 locations at which underpasses are proposed (Keystone, Washington, Arlington and Evans). An estimated 120 daily hours of vehicle delay would be eliminated under this alternative.

See also the discussions related to the above alternatives under Criterion 3 - Public Safety, Criterion 5 - Economic Development and Criterion 8 - Engineering Feasibility.

Alternatives 3A (Second Street) and 3B (Fourth Street) would be viewed under the same arguments that apply to Alternatives 2B (Partially Depressed) through 2E (Over- & Underpasses), 2G (Partially Elevated), and 2I (Minimum Grade Separation). They therefore were judged to satisfy this criterion, assuming implied right-of-way acquisitions are acceptable. These alternatives would result in an estimated 470 hours of vehicle delay per day eliminated.

Alternatives 3C (I-80) through 3E (North McCarran Corridor) would permit existing roadway capacity in the central portion of the City of Reno to be maintained. If the existing main line railroad corridor is abandoned in conjunction with these alternatives, between 470 daily hours (Alternative 3C [I-80]) and 520 daily hours of vehicle delay (Alternatives 3D [Truckee Meadows Bypass] and 3E [North McCarran Corridor]) would be eliminated. If the existing main line is not abandoned, but substantially reduced in use, then substantial delay savings would also be realized. These alternatives were judged to satisfy this criterion.

## ● **Criterion 3: Improve Public Safety**

### **Rail/Vehicle/Pedestrian Conflicts**

The No Build Alternative would not reduce or eliminate existing rail/vehicle/pedestrian conflicts at the existing grade crossings in the central portion of the City of Reno, and therefore was judged to fail this criterion. All of the build alternatives on the existing alignment would result in either complete or partial grade separation of the existing main rail line from the surrounding street system, and therefore all build alternatives would reduce rail/vehicle/pedestrian conflicts, as compared with existing conditions. Of the alternatives on other alignments, they would all

presumably be built to produce complete grade separation from the railroad, as well. The shoofly alternatives within the central portion of the City of Reno (Second, Third & Fourth Streets) would introduce currently non-existing conflicts, but these would occur only for the duration of the construction period. The shoofly alternatives located outside the central portion of the City of Reno would have no effect on existing at-grade conflicts.

### **Firefighting and Other Emergency Service Access**

The City of Reno Municipal Code and City of Reno Fire Department policy, which incorporates portions of the Uniform Fire Code (UFC), are to be regarded as basic guidance documents for the Reno Railroad Corridor. In particular, the following requirements are to be observed:

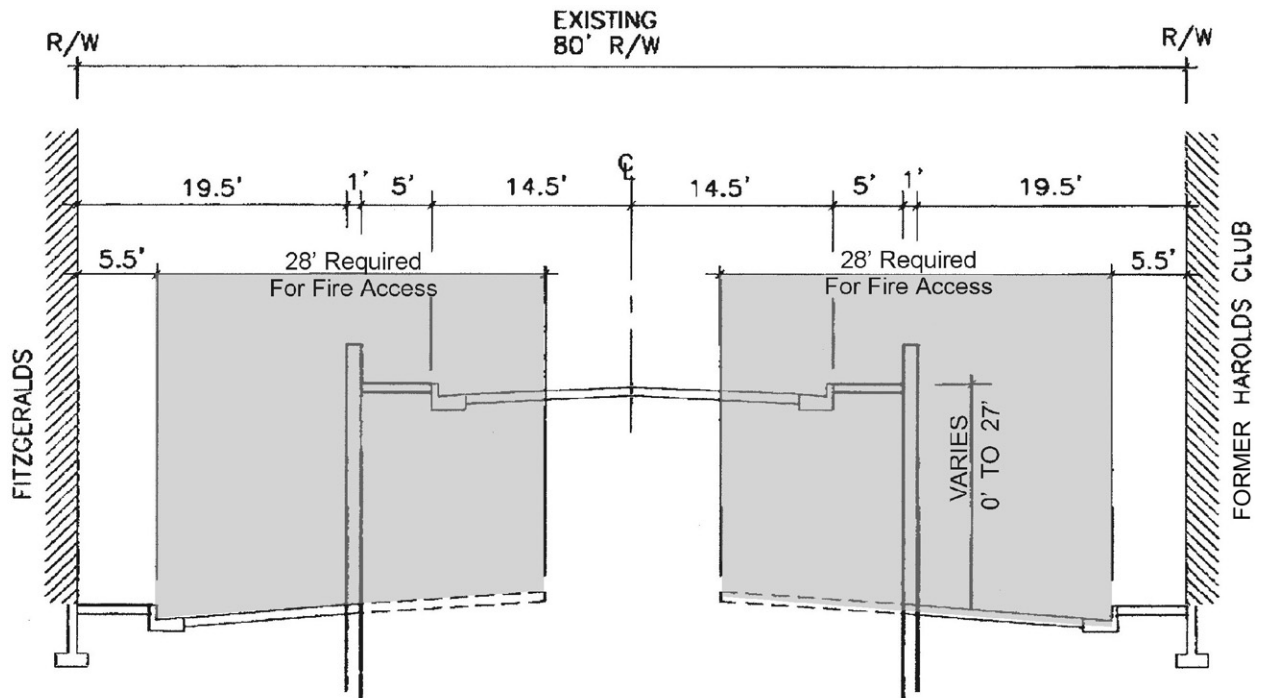
- (1) Permanent all-weather roads must be provided within 150 feet of all portions of the exterior walls of the first story of any building (UFC-P902.2.1).
- (2) In addition, the following requirements must be followed:
  - (a) Permanent all-weather access roads shall be paved surface, following City of Reno Standards, not less than 20 feet in width.
  - (b) When a fire lane must accommodate the operation of fire department aerial ladder apparatus and where fire hydrants are installed, those portions of the fire lane shall not be less than 28 feet in width (UFC-P902.2.2.2.2).

It is understood that the 28-foot lane requirement does not include sidewalk areas in permanent installations, but could include sidewalk areas in temporary installations such as the shoofly (with approval of the Fire Marshall), and if appropriate modifications were included, such as rolled curbs. These basic requirements have been imposed on the alternatives, and also for some alternatives, certain design issues were considered, with the following results.

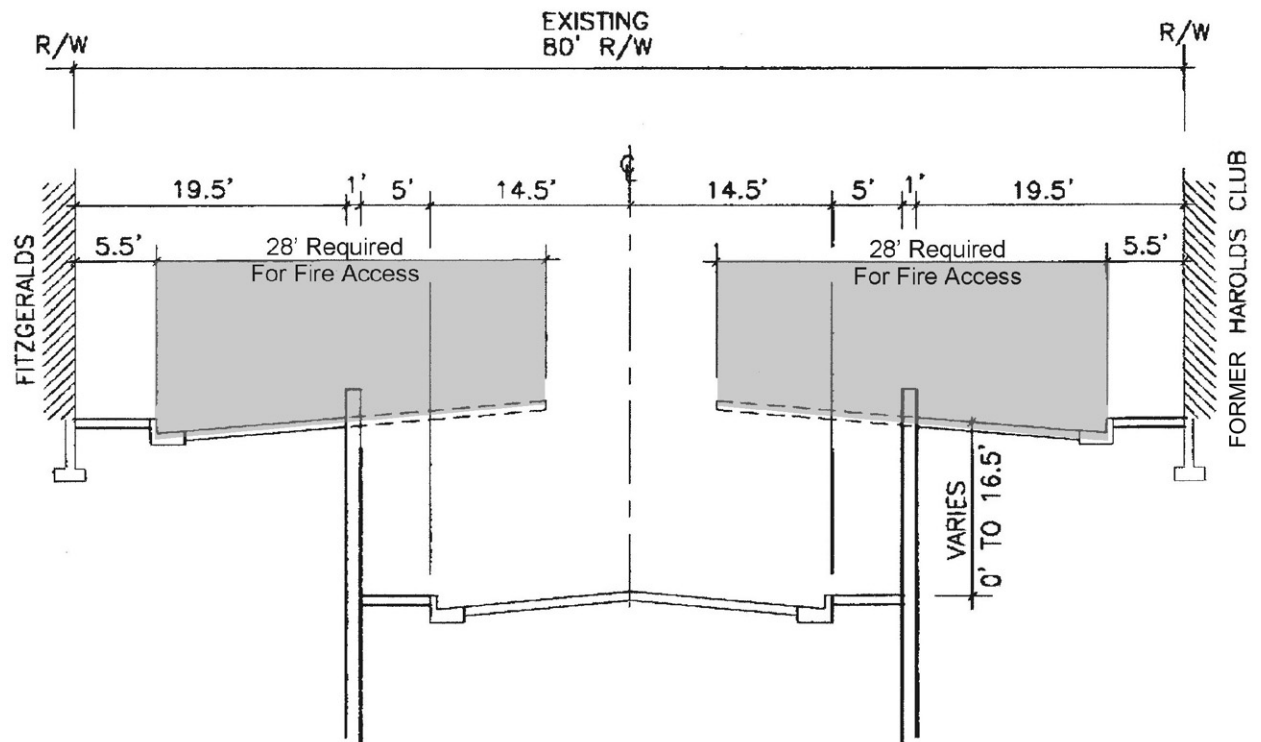
The No Build Alternative would not be affected by the fire requirements.

For Alternative 2A (Depressed), a 13-foot-wide private maintenance way to be used by the UPRR for their maintenance purposes is proposed to be located at the bottom of the trench. Since the code requirement is 20 feet, some further discussion (and possibly some accommodation in design) would be needed to make this acceptable to local fire authorities. Other considerations, such as the number and location of vehicle and person access points, would also need to be evaluated, during the subsequent design phase of corridor development.

The fire code requirement of 28 feet of clearance would apply to these structures in order to accommodate fire ladders to reach the upper stories of adjacent buildings. In addition, a frontage road adjacent to an overpass or an underpass does not meet the 28-foot horizontal clearance requirement for ladder access to adjacent buildings. Even two-lane overpasses or underpasses would not provide the required space. Figure 2-15 illustrates these difficulties. The only way to provide necessary clearances would be to acquire and demolish adjacent buildings, a clearly



2 LANE OVERPASS - NORTH VIRGINIA STREET



2 LANE UNDERPASS - NORTH VIRGINIA STREET

Sources: Stantec, 1999; Myra L. Frank & Associates, Inc., 2000.

**Figure 2-15: Fire Access Requirements**

unacceptable solution. Consequently, Alternatives 2B (Partially Depressed), 2C (Overpasses), 2D (Underpasses), 2E (Over- & Underpasses), and 2G (Partially Elevated) were all judged to fail this screening criterion.

Alternative 2F (Elevated) would not alter existing city streets and therefore would be amenable to the 28-foot fire access requirement. Additional review of the elevated trainway would be needed to explore access requirements and procedures, however.

Alternative 2H (Tunnel) would require substantial involvement of local fire officials to determine the range of access, facility and equipment requirements, and procedures that would be needed for a tunnel. No specific local code requirements are available for an alternative such as this. The City of Reno is currently not equipped or trained to manage an incident within a tunnel, and therefore such preparation would also be needed. The Fire Marshall voiced concerns over handling hazardous materials spills in a closed environment, dangers associated with toxic fumes being confined within a tunnel, the potential for explosion from trapped gases, and difficulties in removing casualties from the tunnel. It is likely that positive ventilation would be required in the tunnel and that air exchange equipment during an incident would also be needed. These problems and issues, however, were determined to be potentially resolvable through appropriate design accommodations and incident response procedures.

Alternative 2I (Minimum Grade Separation) would limit the number of proposed underpasses to four locations in the central portion of the City of Reno. Each of these locations, however, would be subject to the same local fire code requirements discussed under the other underpass alternatives. This alternative was also judged to fail this criterion, for the same reason.

Other Reno Railroad Corridor alignments would have to meet the required local fire code access space specifications. For Alternatives 3A (Second Street) and 3B (Fourth Street), insufficient space would be available. These alternatives were judged to fail this criterion on the basis of an inability to meet the fire code requirement. The tunnel portions of Alternative 3C (I-80) would be able to adhere to the existing fire access requirements.

The remaining build alternatives (3D [Truckee Meadows Bypass] and 3E [North McCarran Corridor]) would not have difficulty in adhering to local fire code requirements.

Of the shoofly alternatives, Alternative 4A (Commercial Row Shoofly) has satisfactory clearances to accommodate the local fire code access requirements, assuming rolled curbs and adjacent sidewalk areas can be included in the available space. Alternatives 4B (Second Street), 4C (Fourth Street) and 4D (Third Street) cannot meet the local fire code requirement, even assuming a one-track shoofly and rolled curbs. For this reason, Alternatives 4B (Second Street Shoofly), 4C (Fourth Street Shoofly), and 4D (Third Street Shoofly) were judged to fail this screening criterion.

Alternative 4E (Feather River Shoofly) would route rail traffic completely out of the central portion of the City of Reno during the construction period and therefore would not be affected by local fire code requirements.

Alternative 4F (Temporary Tunnel) would be subject to the same concerns that pertain to the permanent tunnel.

### **Risks Associated with Derailments**

Accidents posing the greatest potential impacts on public health and safety are derailments potentially involving the release of hazardous substances. In 1994, the national average accident rate for all types of rail accidents was 4.07 accidents per million train-miles. Derailments accounted for 68 percent of the total. Also in 1994, the accident rates for the UPRR and SPRR were 4.07 and 3.96 accidents per million train-miles, respectively. The merger was estimated to yield a potential for 25 accidents per year, nationwide. Using the ratio of 68 percent would yield an estimate of 17 derailments, nationwide (FRA 1998).

Amtrak derailments numbered 35 in 1995 and 55 in 1998, nationwide. Total accidents for Amtrak numbered 1,640 in 1995 and 1,341 in 1998 (FRA 1998).

Within the state of Nevada, over the past 10 years, a total of 44 derailments have occurred on UPRR main line track, or an average of 4.4 per year statewide (FRA 1998).

Within Washoe County, the UPRR derailment experience has totaled 4 incidents over the past 10 years and 8 over the past 15 years. The most recent incident occurred near Wadsworth (approximately 27 miles east of the City of Reno) in December 1993. An 84-car train was involved; no cars derailed. The nearest derailment to the City of Reno occurred in September 1986, near Reynard, about 3 miles east of the City of Reno downtown. Ten cars of a 65-car train derailed as a result of a broken or bent axle. No releases of hazardous substances have occurred in Washoe County as a result of derailments over the past 15 years (FRA 1998).

Highway-rail accidents, nationwide, experienced by the UPRR numbered 1,015 in 1995, decreasing to 681 in 1998. Of these, 136 fatalities occurred in 1995 and 89 in 1998. Similar data for Amtrak were 154 rail-highway accidents in 1995 (with 63 fatalities) and 170 such accidents in 1998 (with 50 fatalities) (FRA 1998).

Applying the accident experience noted above to the alternatives under consideration yields the following.

The No Build Alternative would have no measurable effect on accidents or accident rates.

All of the build alternatives would substantially reduce the likelihood of rail-highway accidents. Alternative 2I (Minimum Grade Separation) would improve this situation the least, however, since it would result in only 4 grade separations in the central portion of the City of Reno.

The data presented above suggest that the probability of a derailment occurring in the immediate vicinity of the central portion of the City of Reno is very small and because of the substantial improvements that would be made to the fixed rail facilities, all of the build alternatives would

likely reduce the probability of a derailment to an even lower value. Of all the build alternatives under consideration, three require further discussion.

Alternatives 2F (Elevated) and 2G (Partially Elevated) would place the trainway above the grade of the local street system. If a derailment were to occur, the potential for risk of personal injury and adverse public health consequences would be greater if the trainway were elevated. If a derailment were to occur overhead, the inertia of motion could involve more cars, rather than fewer, since there would be less confinement provided. A chain reaction might cause several cars to leave the trainway. Since there are no data with which to draw firm conclusions regarding the mathematical probabilities of a catastrophic chain-of-events, only an intuitive approach to the potential problem can be offered. This suggests that if a choice among alternatives is offered in which one choice has the potential to result in serious adverse risks and other choices would not pose such risks, all other things being equal, the choice should be in favor of the lesser risk. Based upon the above rationale, Alternatives 2F (Elevated) and 2G (Partially Elevated) were judged to fail this criterion.

Alternative 2H (Tunnel) also poses some public health and safety risks, since immediate direct access into the tunnel to manage an incident cannot be guaranteed, and also since the conditions inside the tunnel cannot be known until they are experienced first-hand. To partially alleviate this problem, provision for adequate access would need to be designed into the tunnel facility and special procedures would need to be developed for tunnel incident management. The use of positive ventilation equipment in the tunnel would also be required. If an incident were to occur, the tunnel would confine the incident to the interior of the tunnel, in all but the most serious of accidents. It would, however, be more difficult to clear out debris and toppled rail equipment, since there would not be sufficient interior space to use overhead equipment. This alternative is judged to satisfy this screening criterion, assuming adequate design and procedural accommodations are incorporated.

#### ● **Criterion 4: Continue Freight Service**

The No Build Alternative would have no effect on freight service to the City of Reno. It therefore satisfies this criterion.

Alternatives 2A (Depressed) through 2I (Minimum Grade Separation) would all maintain freight service as it currently exists, and therefore would not fail this criterion.

Alternatives 3A (Second Street) and 3B (Fourth Street) would relocate existing freight service to new alignments through the central portion of the City of Reno, but they would not substantially increase train trip lengths. These alternatives were judged to satisfy this criterion, although local service would be diminished.

Alternative 3C (I-80) would relocate freight service to the I-80 Corridor, an increase in line length of approximately 1 mile. This is not a substantial increase. This alternative is judged to satisfy this criterion although local service would be diminished.

Alternative 3D (Truckee Meadows Bypass) would relocate freight movements completely outside the central portion of the City of Reno. Existing local delivery connections in the central portion of the City of Reno would not be severed, and 78 miles of additional train travel would be required to traverse the area from Sparks to Truckee, through portions of difficult territory. Because of the substantial additional travel distance that would be required, this alternative was judged to fail Criterion 4.

Alternative 3E (North McCarran Corridor) would relocate freight movements outside the immediate vicinity of the central portion of the City of Reno, but it would permit train movements to remain within the Truckee Basin. The added travel distance for this alternative would be approximately 15 miles, which is a measurable increase, but clearly not as substantial as the increase required under Alternative 3D (Truckee Meadows Bypass). Existing local delivery connections in the central portion of the City of Reno would also be severed. Because the additional travel distance would be measurable, but not substantial, this alternative was judged to satisfy Criterion 4.

Alternatives 4A (Commercial Row Shoofly) through 4F (Temporary Tunnel) would alter local freight movements and deliveries on only a temporary basis. However, Alternative 4E (Feather River Shoofly) would require rerouting freight traffic over the Feather River route, between Winnemucca, Nevada, and Roseville, California. This would add 82 miles to each train trip for the estimated 3-year construction period and would also require substantial expenditures on the part of the UPRR to upgrade the trackage to provide an adequate level of service. The added travel distance and cost were cause for failure of Alternative 4E (Feather River Shoofly) in light of this criterion.

## ● **Criterion 5: Economic Development**

### **Enhanced Economic Benefits**

Economic benefits are expected to accrue to the City of Reno as a result of separating freight main line traffic from the local street system. These would come in the form of air rights being made available to the City of Reno, and an enhanced downtown core via reduced noise, improved aesthetics, and improved business access. All build alternatives, since they would achieve the desired grade separation, would contribute to this objective. The No Build Alternative, however, would not do so.

The SP Railroad previously negotiated sales of air rights above the existing rail corridor with property owners, primarily located in the downtown core, where building densities are sufficiently high to give these air rights marketability. Some air rights owners have used these rights to create second-story pedestrian bridges across the rail corridor, connecting parking garages to casinos. The privately owned air rights begin at a height of 27 feet above the railroad grade. These rights extend, for purposes of marketability, from approximately Arlington Avenue on the west to Evans Avenue on the east, a distance of six blocks. If a completely grade-separated railroad main line corridor is constructed in the central portion of the City of Reno, the UPRR would cede to the City of Reno those air rights made available by the grade separation, up

to a maximum of 27 feet from grade. This newly acquired real property could then be marketed, permitting property owners to build down to grade, and creating substantial additional buildable space in the downtown core.

Potential transfers of air rights space are made possible under Alternatives 2A (Depressed) and 2B (Partially Depressed), 2F (Elevated) through 2H (Tunnel), and 3A (Second Street) through 3E (North McCarran Corridor). The greatest amount of air rights (0 to 27 feet) is potentially available under Alternatives 2A (Depressed), 2H (Tunnel), and 3A (Second Street) through 3E (North McCarran Corridor). For Alternatives 3A (Second Street) through 3E (North McCarran Corridor), however, this transfer would occur only if: (a) the existing main line corridor is abandoned and (b) such transfer would be permissible by the original land grants under which the UPRR took possession of the underlying fee interest.

Alternative 2B (Partially Depressed) would potentially transfer a portion of air rights space, but without a direct connection down to grade, this would have little value. Alternatives 2F (Elevated) and 2G (Partially Elevated) would similarly transfer rights of questionable value and would also require the City of Reno to purchase some rights already privately owned (Alternative 2F [Elevated] = 12 feet; Alternative 2G [Partially Elevated] = 7 feet).

## **Noise**

Noise (although not a critical screening criterion on its own) currently affects the central portion of the City of Reno, and the downtown core in particular, by disturbing the sleep of nearby residents west of the downtown core and also occupants of the downtown core hotels.

The No Build Alternative would have no effect on hotel sleep disturbance, since it would remain necessary for trains to sound horns and whistles at grade crossings.

All of the build alternatives (except Alternative 2I [Minimum Grade Separation]) on the current alignment would completely grade separate the Reno Railroad Corridor, which would eliminate the need for train safety warning devices. Since horn and whistle noise is the greatest source of annoyance, all build alternatives except 2I (Minimum Grade Separation) would therefore produce a benefit of equivalent proportions.

Both the Elevated (2F) and Partially Elevated (2G) Alternatives would raise the height of the existing operating rail line above grade. Alternative 2F (Elevated) would raise it to a height of 16' 6" above grade, which would place rail operations closer to hotel rooms. This would introduce a noise source that previously was located a farther distance away, and would therefore increase noise exposure to hotel room occupants from locomotive engine noise and wheel-rail noise. This increase would not be as great as the reduction of previously experienced horn and whistle noise, however. Therefore the elevated alternatives would result in some noise benefit but not as great a benefit as the at-grade or below-grade alternatives on the current alignment.

All of the alternatives on other alignments (3A [Second Street] through 3E North McCarran Corridor]) would introduce rail operations noise into areas that are currently not experiencing

such noise exposure. Hotel occupants along Second and Fourth Streets would suffer some sleep disturbance as a result. Alternative 3C (I-80) would also place rail operations noise in proximity to some downtown area residences and motels. The Truckee Meadows (3D) and No. McCarran (3E) routes would also expand noise exposure to areas outside the central portion of the City of Reno that currently do not experience such noise, but would remove the noise from the downtown core.

Alternative 4A (Commercial Row Shoofly) would continue rail noise in the same vicinity as existing, for the duration of the construction period. Alternatives 4B (Second Street Shoofly), 4C (Fourth Street Shoofly), and 4D (Third Street Shoofly) would move rail operations noise, and also horn and whistle noise, to Second, Fourth, or Third Streets, respectively, for the duration of the construction period. The downtown core extends from approximately I-80 on the north to the Truckee River on the south, between approximately Ralston Street on the west to Lake Street on the east. In this area are located numerous hotels, motels and business establishments. Relocating the shoofly to any of these streets would simply be shifting the noise problem (albeit temporarily) from one location to another, with no net benefit to be realized.

### **Aesthetics**

The appearance of the central portion of the City of Reno, and the downtown core in particular, could be changed quite substantially under one or more of the Reno Railroad Corridor alternatives.

The No Build Alternative would create no change to the aesthetics of the existing railroad corridor.

Alternative 2A (Depressed) would place rail operations completely below grade, which would create a positive visual change in the central portion of the City of Reno, if coupled with appropriate visual treatments.

Alternative 2B (Partially Depressed) would also place the rail corridor below grade, but only to a depth of 7-10 feet. In addition, partially elevated street overpasses would occur at 12 north-south streets in the central portion of the City of Reno. As compared with existing conditions, this change would not be positive, since it would not completely remove the rail corridor from view, and would add new above grade visual elements at 12 new locations.

Alternative 2C (Overpasses) would have similar effects on downtown aesthetics as Alternative 2B (Partially Depressed), but would have the added disadvantage of not removing any portion of the rail corridor from view. The existing streetscape would be dominated by the north-south overpass structures. The views would be completely changed to a scene in which the roadway would be the dominant visual element and views of the existing businesses on either side of the street would be substantially impaired, if not totally obscured. It should also be noted that above-grade skyways have been built at a number of locations in the downtown area, including several that span north-south streets scheduled for overpasses in this alternative.

Alternatives 2D (Underpasses) and 2E (Over- & Underpasses) would also leave the existing rail corridor at-grade, but would add underpasses, rather than overpasses, to the downtown visual environment. This would be somewhat less intrusive than full or partial overpasses, but would still not result in a positive change regarding the dominant visual element - the railroad corridor.

Alternative 2F (Elevated) would have no effect on the local street system, but would elevate the railroad corridor above grade, making the corridor more prominent. This new visual element could easily be perceived as more of a visual barrier between the north and south portions of the downtown core than at present. Above-grade skyways that presently span the tracks connecting casinos/hotels to parking garages would need to be removed. Portions of the elevated structure would be completely solid, preventing pedestrian views across the corridor. The viaduct portions of the alternative would have openings between vertical columns, but the massiveness of the overhead guideway needed for structural purposes would clearly be a dominant new visual element.

Alternative 2G (Partially Elevated) would introduce the same new visual element into the environment as under the previous alternative.

Alternative 2H would have the beneficial effect of removing the railroad corridor completely from view in the downtown core, similar to Alternative 2A (Depressed). Alternative 2I (Minimum Grade Separation) would not change the railroad corridor and it would add underpass structures at 4 new locations, which would be an adverse change, but of lesser proportions than other underpass alternatives.

Of the alternatives along other alignments, Alternatives 3A (Second Street) and 3B (Fourth Street) would simply relocate the existing rail corridor to other parts of the central portion of the City of Reno, thereby transferring potentially adverse visual effects into areas currently not subjected to even an at-grade facility. Constructing a new rail corridor along either of these streets would have clearly adverse visual consequences. In both instances, introducing a railroad corridor would create adverse changes in the visual setting of these properties that would be difficult to justify.

Alternatives 3D (Truckee Meadows Bypass) and 3E (North McCarran Corridor) would also relocate rail operations to other corridors outside the central portion of the City of Reno. This would have the benefit of reducing adverse visual effects in the central portion of the City of Reno, but it would have the disbenefit of introducing such adverse effects to other areas. On balance, this would likely create a perceived adverse change.

Alternatives 4A (Commercial Row Shoofly) through 4F (Temporary Tunnel) would create adverse visual changes to their respective visual environments, but these would occur for a temporary period of time, after which the effects would be removed.

**Business Access**

The No Build Alternative would not result in changes to business access compared to the present condition.

Business access under Alternatives 2A (Depressed) and 2F (Elevated) would be improved from existing conditions, since the cross-corridor rail barrier would be removed. Both would produce access problems in close proximity to the corridor during the construction period.

Alternatives 2B (Partially Depressed) through 2E (Over- & Underpasses), 2G (Partially Elevated) and 2I (Minimum Grade Separation) would all require either underpass or overpass structures. As is discussed under Criterion 2 - Circulation, in each case there would be adverse consequences affecting local circulation and access to a number of downtown businesses. In addition, economic activity would be adversely affected by the needed demolition of several second-story skyways.

Alternatives 3A (Second Street) and 3B (Fourth Street) would both impose a new rail corridor into a business environment. Access to local businesses would be limited to one lane on each side of the corridor and no mid-block turning movements would be permitted. Also, several skyways would require removal under these alternatives.

Alternatives 3C (I-80) to 3E (North McCarran Corridor) would remove the railroad throughout the central portion of Reno, having beneficial effects there, but they would also introduce a railroad corridor into new areas, with attendant potential access effects. For purposes of the screening report, it is assumed that these other corridors would involve sufficient grade separation to reduce access problems to an acceptable level.

Alternatives 4B (Second Street Shoofly), 4C (Fourth Street Shoofly), and 4D (Third Street Shoofly) would have the same access difficulties as Alternatives 3A (Second Street) and 3B (Fourth Street), but these difficulties would be temporary. Alternatives 4B (Second Street Shoofly) to 4D (Third Street Shoofly) have the additional disadvantage of requiring demolition of several overhead skyways in several locations in order to provide room for the temporary railway.

Alternative 4E (Feather River Shoofly) would temporarily locate rail service completely out of the central portion of the City of Reno, thereby producing a net business access benefit during the construction period.

Alternative 4F (Temporary Tunnel) would have a potential minor adverse effect on local business access, similar to Alternative 2A (Depressed).

Taking into account the above factors, the following findings were made:

Alternatives 2B (Partially Depressed) and 2C (Overpasses) failed this criterion on the basis of aesthetics and business access.

Alternatives 2D (Underpasses) and 2E (Over- & Underpasses) failed this criterion on the basis of business access.

Alternatives 2F (Elevated) and 2G (Partially Elevated) failed this criterion on the basis of air rights, noise and aesthetics (Alternative 2G [Partially Elevated] also failed on the basis of business access).

Alternative 2I (Minimum Grade Separation) failed on the basis of noise and business access.

Alternatives 3A (Second Street) and 3B (Fourth Street) failed on the basis of noise, aesthetics and business access.

Alternatives 4B (Second Street Shoofly), 4C (Fourth Street Shoofly) and 4D (Third Street Shoofly) failed on the basis of business access.

### ● **Criterion 6: Maintain Amtrak Service**

The No Build Alternative would not alter present Amtrak rail operations.

For purposes of the screening analysis, it is presumed that Amtrak service can continue delivering passengers at the existing station for all build alternatives along the existing alignment. Among these, Alternatives 2A (Depressed), 2B (Partially Depressed), 2F (Elevated), 2G (Partially Elevated) and 2H (Tunnel) would require special design considerations (including vertical access and potentially ventilation requirements) to be incorporated.

Among the build alternatives located on other alignments, maintaining Amtrak service to the City of Reno downtown would be possible under Alternatives 3A (Second Street) to 3C ((I-80). This could either be done via a new downtown station location or at the existing station, assuming Amtrak service would continue to use that line.

Alternatives 3D (Truckee Meadows Bypass) and 3E (North McCarran Corridor) could maintain Amtrak service to downtown, but only if the existing station would continue in use.

The shoofly alternatives may result in a temporary disruption of Amtrak service to downtown, but would not have a permanent effect.

### ● **Criterion 7: Reasonable Cost**

Screening-level capital cost estimates for the Reno Railroad Corridor alternatives are shown in Table 2-4. The cost estimates should be regarded as relative values to be used for comparing alternatives only.

A capital cost estimate in excess of double the estimate for Alternative 2A (Depressed) (or approximately \$400 million) was judged to be an unreasonable cost and therefore any alternative exceeding that threshold was judged to fail this criterion. Alternatives 2H1 (Bored Tunnel), 3C

**Table 2-4: Estimated Costs of Reno Railroad Corridor Alternatives (taken from Alternatives Screening Report\*)**

Alternative	Description	Estimated Capital Cost (millions of 2000 dollars)
1	No Build	NA
<b>Alternatives Along the Existing Alignment</b>		
2A	Depressed Trainway	\$202.6
2B	Partially Depressed Trainway <sup>1</sup>	\$240.0
2C	At-Grade Trainway With Overpasses <sup>2</sup>	NA
2D	At-Grade Trainway With Underpasses <sup>3</sup>	\$286.9
2E	At-Grade Trainway With Overpasses and Underpasses <sup>4</sup>	\$290 (+/-)
2F	Completely Elevated Trainway	\$225.4
2G	Partially Elevated Trainway <sup>5</sup>	\$272.4
2H1	Trainway in Conventional Tunnel	\$572.4
2H2	Trainway in Cover-and-Cut Tunnel	\$261.3
2I	Short Term Grade Separations	\$78.0
<b>Alternatives Along Other Alignments</b>		
3A	Second Street <sup>6</sup>	\$78-\$572
3B	Fourth Street	\$78-\$572
3C	I-80 Corridor <sup>7</sup>	\$517.3
3D	Truckee Meadows Bypass <sup>8</sup>	\$1,000 (+/-)
3E	No. McCarran Boulevard Corridor <sup>8</sup>	\$1,000 (+/-)
<b>Temporary Shoofly Alternatives</b>		
4A	Commercial Row	<del>\$15-\$20</del> \$8-\$9 <sup>10</sup>
4B	Second Street	\$15-\$20
4C	Fourth Street	\$15-\$20
4D	Third Street	\$15-\$20
4E	Feather River Route	NA <sup>9</sup>
4F	Temporary Tunnel	\$500

Notes:

\*The cost estimates shown in this table were prepared during the alternatives screening process for the sole purpose of comparing alternatives. Since that time, other more recent cost estimates have been prepared for purposes of the EIS. Therefore, some of the numbers in the table have been superceded, but are not changed, in order to accurately portray the results of the screening process.

<sup>1</sup> Estimate derived from Alternative 2A (Depressed). Right-of-way costs not included.

<sup>2</sup> This alternative is not feasible for physical reasons (see Criterion 8 - Engineering Feasibility).

<sup>3</sup> Source: Nolte Associates, 1998.

<sup>4</sup> Cost determined to be nearly equivalent to Alternative 2D (Underpasses).

<sup>5</sup> Estimate derived from Alternative 2F (Elevated).

<sup>6</sup> Cost determined to be nearly equivalent to alternatives located along existing alignment.

<sup>7</sup> Source: Nolte & Associates, 1996.

<sup>8</sup> Formal cost estimates not prepared; cursory estimates shown.

<sup>9</sup> Formal cost estimate not prepared, but expected to be substantial (comparable to cost of several complete corridor alternatives), due to the need for substantial railroad facilities (trackage, tunnels, and bridges).

<sup>10</sup> Updated Information taken from Appendix I.

Source: Nolte Team, 1999.

(I-80), 3D (Truckee Meadows Bypass), and 3E (North McCarran Corridor) failed this criterion. Although detailed cost estimates were not prepared for Alternatives 3D (Truckee Meadows Bypass) and 3E (North McCarran Corridor), cursory cost estimates were developed during previous planning efforts in response to the merger. These previous estimates were rounded for inclusion in the present study. All other build alternatives satisfied the criterion.

Of the shoofly alternatives, Alternatives 4A (Commercial Row Shoofly) through 4D (Third Street Shoofly) would have roughly equivalent costs, approximately \$15-\$20 million.

The capital cost for Alternative 4E (Feather River Shoofly) has not been estimated. However, the UPRR has indicated that additional crew expense would be needed to operate on this line, and there would be capital and maintenance expense requirements to improve the route to produce the level of operating integrity required. Included in the cost that is thought to be needed would be sections of double track and/or passing sidings. These costs are felt to be inadvisable when other less costly choices, involving less adverse effects on rail operations, are available.

Alternative 4F (Temporary Tunnel) costs involve construction costs equivalent to the permanent tunnel, perhaps as much as \$500 million.

### ● **Criterion 8: Engineering Reasonableness**

All of the main line projects under the build alternatives would be feasible to construct, with varying degrees of difficulty. Some of the build alternatives involve street grade separations that are not feasible. These exceptions are described below.

Alternative 2A (Depressed) involves construction within the shallow water table that exists in the central portion of the City of Reno and the construction process must be conducted in such a way as to maintain a watertight environment both during the construction process and once the project becomes operational. The application of proven construction methods is expected to yield an acceptable project that can be maintained in a watertight condition once it becomes operational. This alternative was judged to satisfy this criterion. This same finding would apply to Alternative 2B (Partially Depressed).

Alternative 2C (Overpasses) would require construction of full overpasses, at a height of 23 feet above grade to the underside of the overpass structure, to permit the passage of a train beneath. A total horizontal distance of 1,500 feet (750 feet on either side of the railroad centerline) is needed to allow the overpass structure to come down to grade at an acceptable automobile grade of 6 percent. Only 1,100 feet exist between Second and Fourth Streets, which parallel the rail corridor to the south and north. It is therefore not possible to construct this alternative without substantially reconstructing the entire street system in the central portion of the City of Reno. This alternative was judged to fail this criterion.

Alternative 2E (Over- & Underpasses) calls for the construction of underpasses throughout the central portion of the City of Reno, except for Keystone Avenue, which would be an overpass.

This would require realignment of Fourth Street, and in addition, the distance would still be insufficient to permit the overpass, and therefore a substantial reconstruction of the local street system would be needed. This alternative therefore failed the criterion for the same reason as Alternative 2C (Overpasses).

Alternative 2H (Tunnel) could be constructed using one of two methods. Using conventional tunneling methods, it would be expected that surface settlement directly above the tunnel might occur and that as much as 2 inches of surface settlement could be expected. The UPRR has indicated that such settlement would not be acceptable for railroad operations. This tunneling method has a substantial risk of failure without extraordinary precautions being taken, which would add to the already unacceptable high cost. This alternative was judged to fail this criterion.

The second tunneling method (Alternative 2H2 – Cover-and-Cut Tunnel) however, would involve conventional excavation methods and it would provide a suitable at-grade support system for temporary rail operations. There would be little risk of settlement during the construction process. This alternative was judged to satisfy this criterion.

Shoofly alternatives must be considered in order to fully examine the feasibility of the remaining build alternatives. Both the Partially Depressed (2B) and Partially Elevated (2G) Alternatives can only be constructed with shooflies 4B, 4C, 4E, and 4F. This is so because both Commercial Row and Third Street are located too close to the main line to permit construction of the needed physical elements while at the same time allowing sufficient vertical clearance with the at-grade street system. Shoofly Alternatives 4B (Second Street Shoofly) and 4C (Fourth Street Shoofly) were rejected for reasons of economic development (see Criterion 5), Alternative 4E (Feather River Shoofly) was rejected for reasons of freight service (see Criterion 4) and cost (see Criterion 7), and Alternative 4F (Temporary Tunnel) was rejected for reasons of cost (see Criterion 7). As a result, since build Alternatives 2B (Partially Depressed) and 2G (Partially Elevated) can only be paired with infeasible shoofly alternatives, these build alternatives were deemed infeasible.

## **2-6 ALTERNATIVES REJECTED FROM FURTHER CONSIDERATION**

Table 2-5 shows the results of applying the Critical Screening Criteria to the Reno Railroad Corridor alternatives. Based upon the analysis previously presented, and as summarized in this table, the following recommendations were made:

The following alternatives were *recommended for deletion* from further study:

### **Alternatives Along the Existing Alignment**

- 2B Partially Depressed
- 2C At-Grade Trainway with Overpasses
- 2D At-Grade Trainway with Underpasses

**Table 2-5: Reno Railroad Corridor - Alternatives Screening Matrix**

Alternatives	Critical Screening Criteria							
	1. Eliminate Grade Crossings	2. Improve Circulation	3. Improve Public Safety	4. Continue Freight Service	5. Promote Economic Development	6. Maintain Amtrak Service	7. Reasonable Cost	8. Engineering Reasonableness
1 - No Build								
<b>Alternatives Along the Existing Alignment</b>								
2A - Depressed Trainway								
2B - Partially Depressed								
2C - Overcrossings								
2D - Underpasses								
2E - Over/Under Comb.								
2F - Elevated								
2G - Partially Elevated								
2H1 - Conventional Tunnel								
2H2 - Cover and Cut Tunnel								
2I - Short Term Grade Seps.								
<b>Alternatives Along Other Alignments</b>								
3A - Along 2 <sup>nd</sup> Street								
3B - Along 4 <sup>th</sup> Street								
3C - I-80 Corridor								
3D - Truckee Bypass								
3E - No. McCarran Blvd.								
<b>Shoofly Alternatives</b>								
4A - Commercial Row	N/A	N/A				N/A		
4B - 2 <sup>nd</sup> Street	N/A	N/A				N/A		
4C - 4 <sup>th</sup> Street	N/A	N/A				N/A		
4D - 3 <sup>rd</sup> Street	N/A	N/A				N/A		
4E - Feather River Route	N/A	N/A				N/A		
4F - Temporary Tunnel	N/A	N/A				N/A		

Source: Nolte Team, 1999.

	Satisfies criterion
	Does not satisfy criterion

- 2E At-Grade Trainway with Overpasses & Underpasses
- 2F Elevated Trainway
- 2G Partially Elevated Trainway
- 2H1 Conventional Tunnel
- 2I Short Term Grade Separations

**Alternatives Along Other Alignments**

- 3A Second Street
- 3B Fourth Street
- 3C I-80 Corridor
- 3D Truckee Meadows Bypass
- 3E No. McCarran Boulevard Corridor

**Shoofly Alternatives**

- 4B Second Street
- 4C Fourth Street
- 4D Third Street
- 4E Feather River Route
- 4F Temporary Tunnel

The following alternatives were recommended for inclusion in the EIS:

- Alternative 1 - No Build
- Alternative 2A - Depressed Trainway; with Alternative 4A (Commercial Row Shoofly)
- Alternative 2A1 – Extended Depressed Trainway (a variation of Alternative 2A) with Alternative 4A (Commercial Row Shoofly)
- Alternative 2H2 – Cover-and-Cut Tunnel; with Alternative 4A (Commercial Row Shoofly) (easterly from West Second Street to Arlington Avenue and again from Evans Avenue to east of Sutro Street).

## **2-7 ALTERNATIVES TO BE CONSIDERED IN THE EIS**

As is noted in the previous section, a comprehensive alternatives screening process was conducted which led to the rejection of certain alternatives on the basis of their inability to satisfy critical screening criteria. Those alternatives that survived the screening process ~~are being~~ were carried forward into the ~~environmental document~~ DEIS. They included: No Build, Depressed Trainway, Extended Depressed Trainway and Cover-and-Cut Tunnel. Subsequent to the DEIS, in consideration of the complete record including public comments on the DEIS, a Preferred Alternative (Alternative 5 – Modified Extended Depressed Trainway) was identified. ~~They~~ These five alternatives are described in the sections that follow.

### **2-7.1 Alternative 1: No Build**

As the name implies, this alternative would not construct a fully grade-separated main line railroad corridor through the central portion of the City of Reno. It also would not construct individual grade separations along any of the existing north-south at-grade crossings in the central portion of the City of Reno. Should there be sufficient demand for grade separations in the future, they would be pursued individually through the City of Reno's normal capital improvement process, but for purposes of this document, no such projects are assumed to be in place between the present and the year 2030. Also, existing street traffic capacity would remain unchanged; no street widenings are assumed within the No Build Alternative as well. The year 2030 has been selected as the planning horizon year for this EIS in order to be consistent with regional transportation planning assumptions articulated by the local Metropolitan Planning Organization (MPO) for the area, which is the Regional Transportation Commission (RTC). If none of the build alternatives were determined to be acceptable, the No Build Alternative would define the conditions applicable to the central portion of the City of Reno in the presence of projected freight rail traffic in the year 2030. It therefore serves to establish a baseline against which the effects of the build alternatives can be measured.

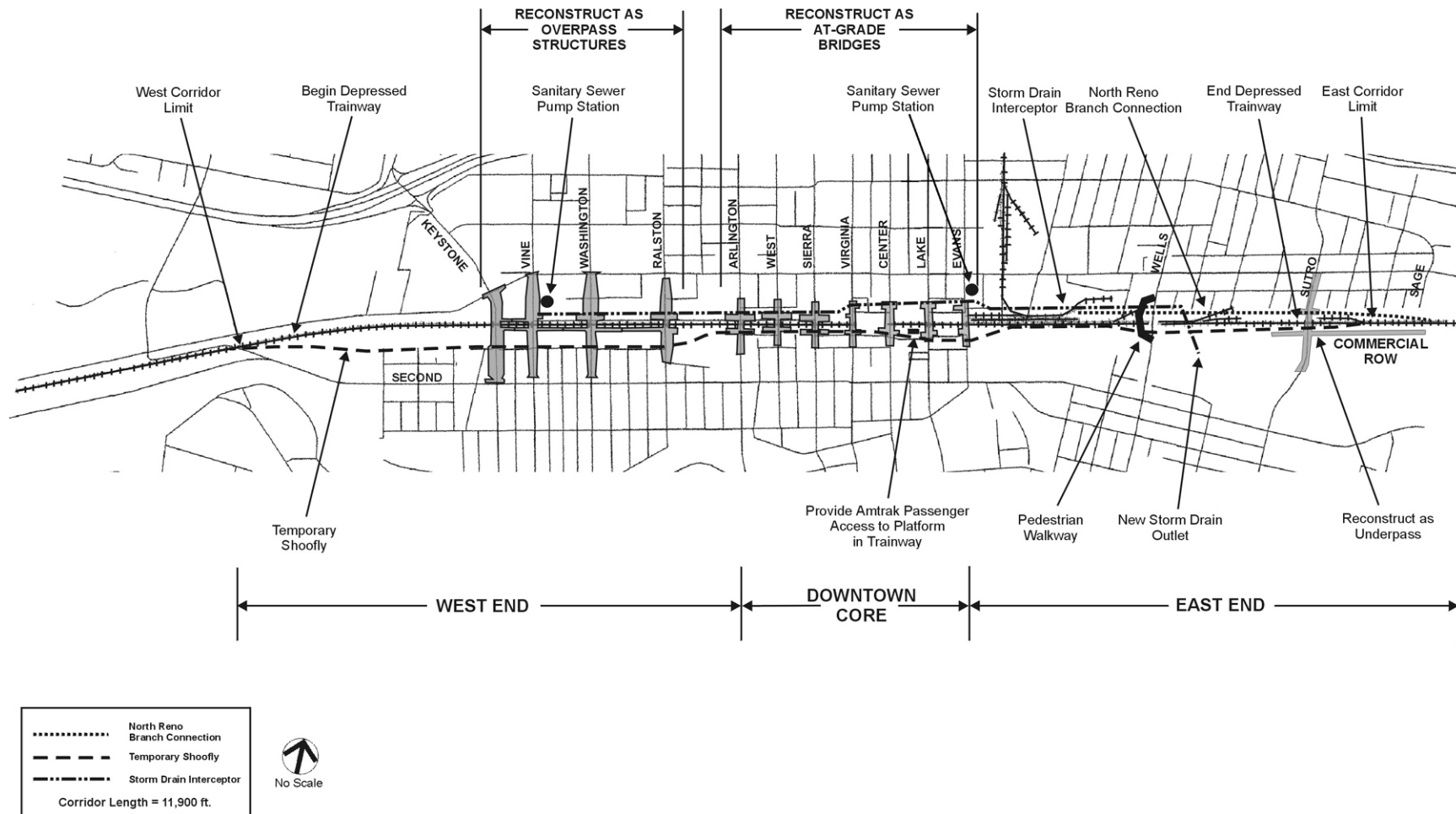
The merger of the Union Pacific and Southern Pacific Railroads (now known under the name of Union Pacific Railroad; UPRR) will result in increased freight train activity on the UPRR's Central Corridor which operates through the central portion of the City of Reno. Currently, 12-14 freight trains pass through the central portion of the City of Reno on a daily basis. By the year 2004 (established to reflect conditions during the Reno Railroad Corridor construction period), it is estimated that between 12 and 24 trains per day will pass through the central portion of the City of Reno. By the year 2030, freight train volumes are estimated to be between 24 and 36 trains per day. Freight train movements through the central portion of the City of Reno are scheduled by the UPRR and are assumed to be randomly distributed over the course of a 24-hour day. Using this assumption, at present a freight train would pass through the central portion of the City of Reno once every 2 hours. By the year 2004, this frequency would be once every 1-2 hours, and in the year 2030, once every 45 minutes to 1 hour.

It is assumed for purposes of this analysis that UPRR trains travel through the central portion of the City of Reno at a speed of 20 miles per hour (mph), and would continue to do so under the No Build Alternative. Typical freight trains currently passing through on the UPRR Central Corridor are approximately 6,500 to 8,000 feet long. However, the use of distributed power, which enables railroads to operate longer trains, is increasing in the railroad industry. At 20 miles per hour, the length of time needed for a typical train to clear an existing at-grade crossing is approximately 3.7 minutes. Therefore, under present conditions (12 trains per day), approximately 1.85 minutes every hour would be spent by motorists waiting at grade crossings. By the year 2004, this would increase to between 1.85 and 3.7 minutes per hour; and by the year 2030, to between 3.7 and 5.5 minutes per hour.

Also at the present time, two Amtrak passenger trains stop in the central portion of the City of Reno each day; one each in the eastbound and westbound direction operating on the “California Zephyr” route which connects Emeryville, California with Chicago, Illinois. These trains stop for passenger boarding via an at-grade platform to the rear of the station, for an estimated 20 minutes during each stop. There is some planning underway which could lead to an increased number of daily passenger trains (see Section 2-8), but for purposes of this EIS, it is assumed that two Amtrak trains per day will continue to serve the City of Reno. The existing Amtrak Station, located on Commercial Row at Lake Street, is assumed to remain and continue this function into the foreseeable future.

## **2-7.2 Alternative 2: Depressed Trainway**

Alternative 2 would construct a fully grade-separated two-track main line railroad corridor through the central portion of the City of Reno, from the vicinity of West Second Street on the west to Sutro Street on the east. The rail corridor would become a trench, or depressed trainway, descending and ascending at a 1.0-percent grade. (Freight trains cannot negotiate steep grades and therefore grades approaching 1.0-percent are desirable.) The length of the corridor would be an estimated 11,900 feet. The depressed trainway would be 54 feet wide and at its deepest, would be 31 feet below grade. In order to prevent unwanted entry into the depressed trainway, a continuous concrete barrier (approximately 39 inches high) would be installed along the perimeter. On top of the concrete barrier would be installed a non-mountable fence. The fence would be approximately 33 inches in height, for a total height of approximately 72 inches above grade. Material for the fence has not been selected at the present time. The structure of the depressed trainway would be reinforced concrete with vertical walls supported either by means of tiebacks extending into the surrounding soil on either side of the corridor or struts connecting at the top of the two parallel walls (see Chapter 4 for a discussion of these supports). The corridor would be designed to permit 60 mph operating speeds through the central portion of the City of Reno. The corridor is shown schematically in Figure 2-16; detailed drawings are provided in Volume 2 of this EIS.



Sources: Information Delivery Service, 1999; Myra L. Frank & Associates, Inc., 2000.

**Figure 2-16: Alternative 2 – Depressed Trainway**

The capital cost of this alternative is estimated to be \$213 million. Costs have been estimated based upon engineering completed to approximately the 10 percent level. Current cost estimates include allowances for mitigation of historic property impacts, reconstruction of pedestrian overcrossings, relocation of a substation, and relocation of the connection to Union Pacific Railroad's North Reno Branch Line. As engineering progresses, more detailed and refined cost estimates can be produced. Design for the preferred alternative when selected will be advanced to the 20 percent to 30 percent range as preliminary engineering is completed. Summary cost estimates are provided in Appendix I.

## ● **Corridor Alignment and Street System**

The corridor would begin at a point just to the east of the existing West Second Street underpass. It would begin a descent at a 1.0-percent grade from this point. The corridor would remain centered within the existing UPRR right-of-way (the UPRR right-of-way varies in width from 54 feet to 200 feet). Vertical trench walls, 54 feet apart, would begin at a point about 300 feet east of West Second Street.

As the corridor proceeds to the east, four streets in the central portion of the City of Reno would be constructed as overpasses. Keystone Avenue, the first of these, if left at-grade, would be only 15 feet above the railroad track (referred to as "top of rail"). A vertical clearance of 23 feet is prescribed by national standards. Therefore, the crown of Keystone Avenue must be raised to a height of 11.5 feet above grade in order to provide the appropriate clearance above the railroad corridor. The 4-lane Keystone Avenue overpass would be brought down to grade at Second and Fourth Streets. In addition to the overpass structure, at-grade local access roads would also be constructed, on the east side of the overpass (from Second Street to the railroad corridor and from the corridor to Fourth Street) and on the west side of the overpass (from Second Street to the alley north of Second Street).

At Vine Street, Washington Street and Ralston Street, overpass structures would also be required, ranging in height above grade from 9.5 feet at Vine, to 7.2 feet at Washington, to 3.6 feet at Ralston. Each of these three four-lane overpasses would also have at-grade local street access on both the east and west sides of the overpasses, from both Second Street and Fourth Street.

Once the corridor reaches Arlington Avenue, there would be sufficient vertical clearance from the top of rail to make it possible to carry the remaining downtown streets across the corridor on at-grade bridges. This would be true for the following streets: Arlington Avenue, West Street, Sierra Street, Virginia Street, Center Street and Lake Street. Evans Avenue would be constructed as a new 4-lane overpass, nearly at-grade (3.0 feet above existing grade). The corridor would be its deepest (about 27 feet below grade, measured from top of rail) at about Virginia Street.

t Wells Avenue, the new rail corridor would be on its ascent, 16 feet below grade. The rail corridor would conflict at this point with the existing Wells Avenue underpass bridge, which would need to be removed, leaving only the overpass bridge on Wells Avenue for vehicular access across the corridor. This would also result in the removal of the existing pedestrian access to the Truckee River from lower Wells Avenue. This would be replaced with a new pedestrian bridge to be built on the west side of Wells Avenue. The pedestrian bridge would begin a short distance north of the railroad corridor on the west side of Wells Avenue (which would become a cul-de-sac), it would continue to the west and south across the corridor, and then transition back to the east to provide access to the river and connect again with Wells Avenue.

The railroad corridor would continue to ascend and it would attain existing grade just before reaching Sutro Street. Sutro Street would be reconstructed as a 4-lane underpass crossing beneath the rail corridor with 16 feet of vertical clearance. The new underpass would transition back to grade at Fourth Street and a short distance south of Commercial Row. Commercial Row, in order to provide an intersection with Sutro Street, would also be reconstructed as a depressed roadway section, meeting Sutro Street at about 15 feet below grade. Commercial Row would transition back to grade at points about 400 feet to the north and 450 feet to the south of Sutro Street. Sage Street, located approximately 1,200 feet east of Sutro Street, would remain at-grade and would be repaved.

### ● **Amtrak Service**

Under this alternative, two Amtrak trains would stop in the City of Reno daily and would be serviced from the existing station location. From the ticketing area, passengers would enter a new building addition, to be constructed on the west side of the station as part of the proposed corridor, from which they would descend via stairs or elevator to the boarding platform below when an Amtrak train is ready for boarding. The boarding platform would be a part of the private maintenance way constructed on the south side of the main line tracks.

### ● **North Reno Branch Connection**

An ancillary part of the corridor would provide a new connection from the reconstructed main line to the existing North Reno Branch line. The North Reno Branch provides local service to UPRR customers and also connects with other UPRR tracks running north through the City of Reno. Under an existing cooperative agreement between the City of Reno and the UPRR, the proposed corridor improvements would include restoring a connection to the North Reno Branch. The North Reno Branch connection would begin at the east end of the corridor, just to the west of Sutro Street. It would follow a westerly alignment adjacent to and north of the corridor. At a point about 200 feet east of Record Street, the connection would terminate. The UPRR ~~would be~~ is responsible for any further improvements beyond this point.

### ● **Storm Drain and Sanitary Sewer Systems**

The proposed depressed trainway would intercept a portion of the existing storm drain system. The affected portion runs from Vine Street on the west to Wells Avenue on the east. In this

reach, six existing storm drain outlets to the Truckee River would be intercepted: Vine Street, Washington Street, Arlington Avenue, Evans Avenue, Record Street and Wells Avenue. In order to provide the continued conveyance of storm water flow through this area, a new storm water box culvert would be constructed, approximately 7,150 feet in length, connecting with the existing system at Vine Street and providing one new outlet to the river in the vicinity of Morrill Avenue. The size of the new storm drain box culvert would range from 5 feet x 10 feet to 7 feet x 12 feet. It would provide 1,130 cubic feet per second (cfs) of hydraulic capacity, which matches the existing flow capacity. Approximately 90 percent of the storm water runoff in the affected reach would be reconveyed in the new box culvert. The remaining 10 percent currently flows through other existing drains south of the railroad corridor; these would remain as is. The new storm drain interceptor would be constructed below grade and would be immediately adjacent to the north side of the railroad corridor through the downtown core, except for a segment running beneath Plaza Street, between Virginia Street and Evans Avenue. Another segment would run north of the corridor between Valley Road and Wells Avenue, in order to clear the North Reno Branch connection.

There are approximately 5,800 linear feet of the proposed depressed trainway that would be below the elevation of the storm drain system and therefore would require a lift station to prevent the depressed rail corridor from flooding during the design standard 100-year storm event. The lift station would be located at the east end of Plaza Street where it meets Evans Avenue. The storm water lift station would provide pumping capacity and storm water pretreatment for first flush runoff (normally equivalent to a two-year storm). Pumping capacity of 1,300 to 1,500 gallons per minute (gpm) is proposed. A below grade wet well of approximately 50 feet x 50 feet x 36 feet deep is proposed. The lift station would pump flow from the trench to a diversion box. The diversion box would provide for overflow of amounts greater than the first flush runoff, so that the 100-year storm would pass through, but the first 1,000 gpm would be retained for pretreatment. Pretreatment would consist of running the flow through an oil/water separator with a capacity of 1,000 gpm. From the oil/water separator, the post-treated flow would be conveyed into the gravity discharge storm drain. The oil and grease remaining behind would be removed and disposed of in accordance with local regulations.

A portion of the existing gravity-fed sanitary sewer system would also be intercepted by the depressed trainway and therefore would also need to be reconstructed as part of the proposed railroad corridor. Approximately 800 feet of reconstructed sewer line would be needed, extending from the vicinity of Lake and Plaza Streets to the vicinity of Record Street, where a reconnection to the existing system would occur. A pump station would be constructed at the northeast corner of Lake and east end of Plaza Streets, where it meets Evans Avenue, with both wet (55 feet x 110 feet) and dry (30 feet x 80 feet) wells. Pumping capacity of 2,400 gpm would be provided. There is also approximately 800 feet of 24-inch diameter force main that would need to be installed from the pump station to the existing gravity line located in Lake Street south of the railroad corridor. A second sanitary sewer lift station, located on the northeast corner of Vine Street and Third Street, would also be constructed. It would be of the same size wells as the Lake/Plaza lift station, but would have a pumping capacity of 1,575 gpm.

## ● **Other Utilities**

The proposed depressed trainway would intercept many existing below grade utilities, including electricity, natural gas, water supply, telephone, cable and traffic signal equipment. These utilities would require at least temporary relocation and also permanent relocation, in most instances. A more detailed discussion of this can be found in Chapter 4 of this EIS.

## ● **Shoofly**

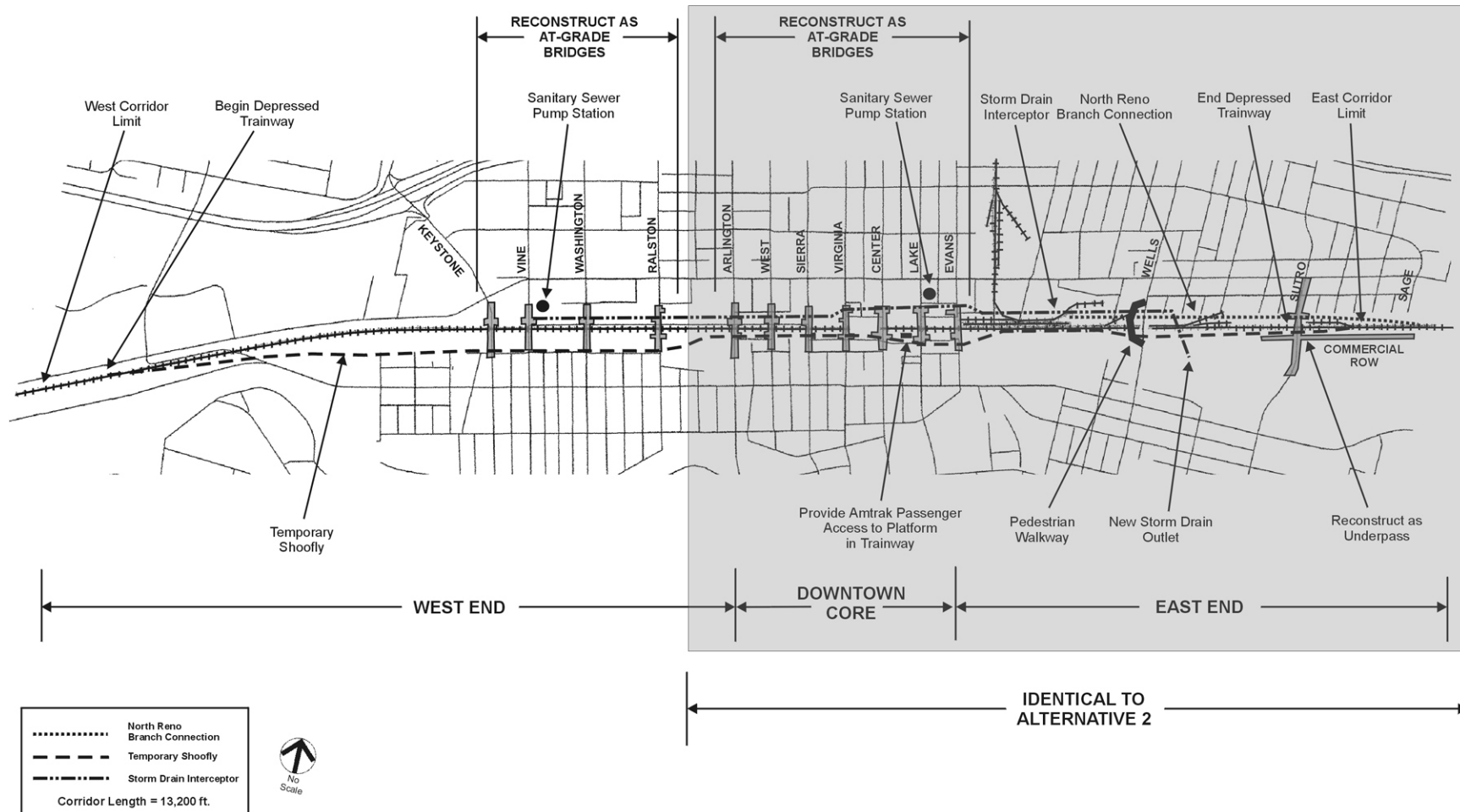
In order to construct the depressed trainway, freight train and Amtrak operations must be diverted from the existing double track main line. To accomplish this, a temporary “shoofly” would be constructed, in two configurations, to accommodate construction in different parts of the corridor. Double track shooflies would be provided on the west and east ends of the corridor. On the west end, the shoofly would extend from the vicinity of West Second Street to Arlington Avenue and on the east end, from Evans Avenue to Sutro Street. The west end shoofly would follow an alignment parallel to and south of the existing main line, running along an existing alley located north of Second Street. At Ralston Street, the shoofly would transition back to the north to join the main line. On the east end of the corridor, the shoofly would leave the main line at Evans Avenue to follow an alignment adjacent and immediately to the south. It would pass in very close proximity to the Rusty Spike 115 KV electrical substation (located between Valley Road and Park Street), encroaching on the substation property and requiring partial reconstruction of the substation facility. The substation could continue to operate as at present, however. From the substation, the shoofly would turn slightly to the south to negotiate an alignment through the Wells Avenue overpass support columns and then rejoin the main line at a point beyond Montello Street.

The downtown core configuration of the shoofly would be a single-track facility, running along Commercial Row between Arlington Avenue and Evans Avenue. At Center Street, the shoofly would make a jog to the south to avoid three buildings; the Amtrak Station, Men’s Club and Freight House.

For a more complete discussion of the shoofly and its relationship to the construction of the corridor, see Chapter 4.

### **2-7.3 Alternative 3: Extended Depressed Trainway**

Alternative 3 would construct a fully grade-separated two-track main line railroad corridor through the central portion of the city of Reno, from a point approximately 980 feet west of West Second Street on the west end to Sutro Street on the east end. The corridor would become a trench, or depressed trainway, descending at a 1.2-percent grade on the west and ascending at a 1.0-percent grade on the east. The length of the corridor would be an estimated 13,200 feet. The depressed trainway would be 54 feet wide and 33 feet deep. The corridor is shown schematically on Figure 2-17; detailed drawings are provided in Volume 2 of this EIS.



Sources: Information Delivery Service, 1999; Myra L. Frank & Associates, Inc., 2000.

**Figure 2-17: Alternative 3 – Extended Depressed Trainway**

The capital cost of this alternative is estimated to be \$226 million. Costs have been estimated based upon engineering completed to approximately the 10 percent level. Current cost estimates include allowances for mitigation of historic property impacts, reconstruction of pedestrian overcrossings, relocation of a substation, and relocation of the connection to Union Pacific Railroad's North Reno Branch Line. As engineering progresses, more detailed and refined cost estimates can be produced. Design for the preferred alternative when selected will be advanced to the 20 percent to 30 percent range as preliminary engineering is completed. Summary cost estimates are provided in Appendix I.

Because this alternative begins at a point farther west than Alternative 2 and also because it begins its descent at a steeper grade, it would attain a depth below grade of approximately 27 feet (measured from top of rail) by the time it reaches Keystone Avenue. As a result, all of the north-south cross streets can be reconstructed as at-grade bridges without the need for overpass structures.

Once proceeding past Ralston Avenue, the extended depressed trainway alternative would be identical to Alternative 2. Also, all of the ancillary elements of the corridor (storm drain, sanitary sewer, Wells Avenue pedestrian bridge, Amtrak Station, shoofly, etc.) would be the same as described under Alternative 2 above. Two alternative methods of constructing this alternative have been postulated. These are described in detail in Chapter 4.

## **2-7.4 Alternative 4: Cover-and-Cut Tunnel**

### **● Corridor Alignment and Street System**

Alternative 4 would construct a fully grade-separated two-track main line railroad corridor through the central portion of the City of Reno, from a point approximately 980 feet west of West Second Street on the west end to approximately Sage Street on the east end. The corridor would become a trench, or depressed trainway, descending at a 1.2-percent grade on the west. At approximately Vine Street, the grade would become more shallow (0.67 percent), steepen slightly at Arlington Avenue (0.81 percent), and then beginning at about the Rusty Spike substation, begin ascending at a grade of 0.35 percent until approximately Montello Street, where it would ascend at a grade of 0.93 percent to reach grade and terminate at a point approximately 1,200 feet east of Sage Street. The depressed trainway would be 54 feet wide and 34 feet deep.

At about Arlington Avenue, the corridor would become a 54-foot-wide tunnel, which would remain so until just past Valley Road, a distance of approximately 3,000 feet. The length of the corridor would be an estimated 14,050 feet. The added length occurs as a result of lowering the elevation of the railroad top of rail in order to accommodate the thickness of the tunnel cover. Constructing the corridor as a tunnel in this reach, rather than an open trench, would obviate the need for a temporary shoofly along Commercial Row in the downtown core segment of the corridor. Construction of this portion of the corridor as a tunnel would require specialized construction methods that are discussed in Chapter 4.

The corridor is shown schematically on Figure 2-18; detailed drawings are provided in Volume 2 of this EIS. The capital cost of this alternative is estimated to be ~~\$262~~ \$253 million. Costs have been estimated based upon engineering completed to approximately the 10 percent level. Current cost estimates include allowances for mitigation of historic property impacts, reconstruction of pedestrian overcrossings, relocation of a substation, and relocation of the connection to Union Pacific Railroad's North Reno Branch Line. As engineering progresses, more detailed and refined cost estimates can be produced. Design for the preferred alternative when selected will be advanced to the 20 percent to 30 percent range as preliminary engineering is completed. Summary cost estimates are provided in Appendix I.

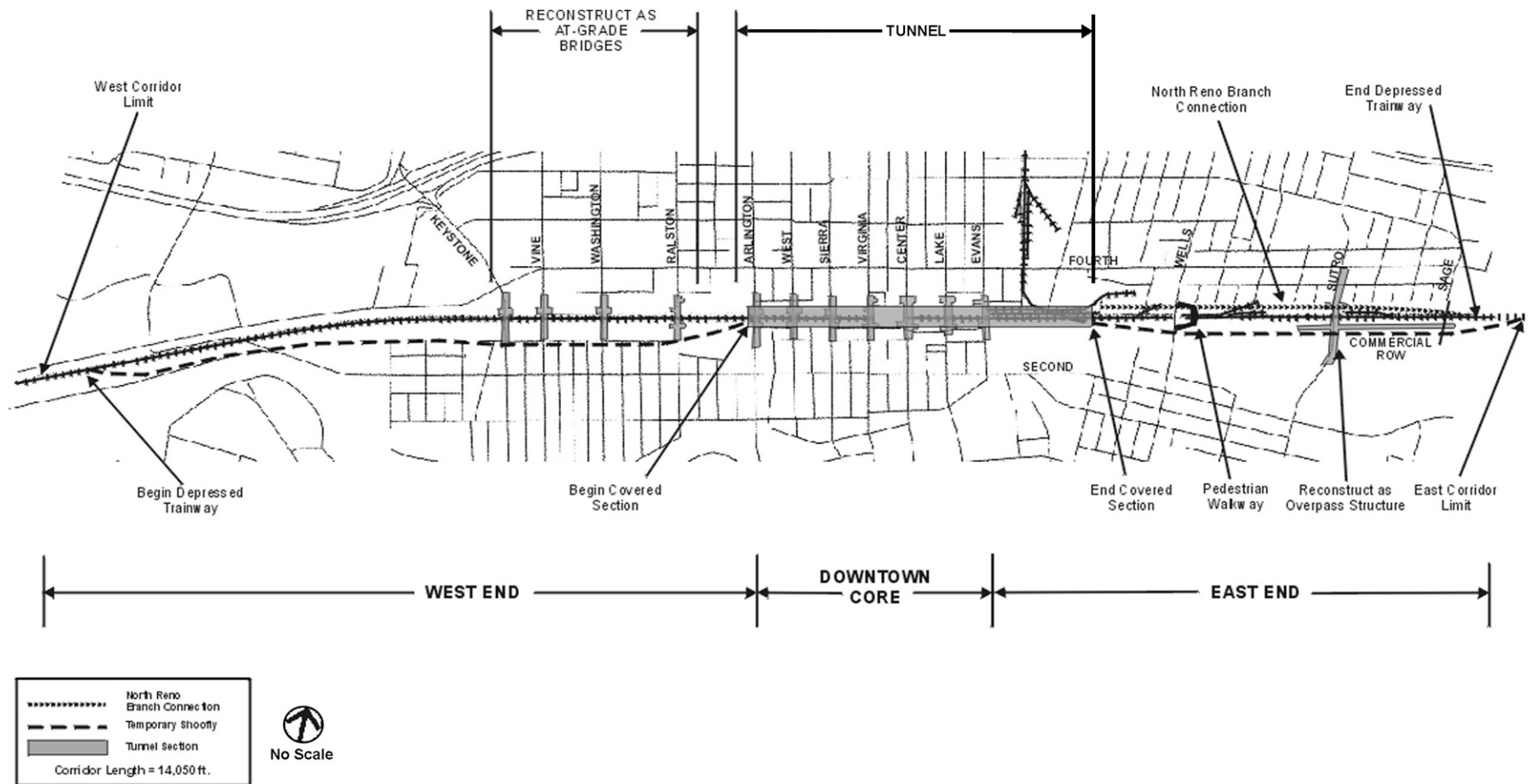
The reconstructed street system would be essentially as described under Alternative 3, with the following exceptions:

- (1) The Wells Avenue pedestrian bridge would be constructed on the east side of Wells Avenue instead of the west side.
- (2) Sutro Street would become an overpass rather than an underpass. It would be about 9 feet above existing grade, thereby providing the appropriate 23 feet of vertical clearance to top of rail below.
- (3) Commercial Row would need to be elevated to meet Sutro Street at approximately 7 feet above grade.
- (4) Sage Street would become slightly depressed (about 4 feet below existing grade) to cross the railroad corridor at top of rail.

### ● **Amtrak Service**

Under this alternative, two Amtrak trains would stop in the City of Reno daily and would be serviced from the existing station location. From the ticketing area, passengers would enter a new building addition, constructed on the west side of the station, from which they would descend via stairs or elevator to the boarding platform below, when an Amtrak train has arrived and is ready for boarding. The boarding platform would be a part of the maintenance way constructed on the south side of the main line tracks.

Ventilation equipment would be installed in the tunnel and would be operating while passengers are disembarking or boarding the train. The purpose of the ventilation equipment would be to clear the tunnel of harmful locomotive emissions. Further analysis of this issue can be found in Section 5-11 of this EIS. Additional noise would be produced in the tunnel station from either entering trains or operating ventilation equipment. Both of these issues are addressed in section 5-4 and 5-11 of this EIS. Adverse environmental conditions associated with freight locomotives operating inside the tunnel would make it undesirable for passengers to be on the tunnel station platform while a freight train is in the tunnel. Therefore, it would be necessary to establish a policy of excluding the simultaneous occupancy of the tunnel by freight trains and Amtrak passengers.



Sources: Information Delivery Service, 1999; Myra L. Frank & Associates, Inc., 2000.

**Figure 2-18: Alternative 4 – Cover-and-Cut Tunnel**

### ● **North Reno Branch Connection**

The North Reno Branch connection would begin at approximately Montello Street and would require that the depressed trainway trench be widened to accommodate the added track adjacent to the north of the main line tracks. At approximately Quincy Street, the North Reno Branch trench would separate from the main line trench, continuing to the west until Valley Road, where the connection would terminate at-grade. Between Quincy Street and Valley Road, therefore, two railroad corridor trenches would be constructed, at two different grades, one for the main line trainway and one for the North Reno Branch connection. The length of the North Reno Branch connection, under this alternative, would be approximately 3,600 feet (to connect with the main line in the vicinity of Sage Street), as compared with the 2,600 feet needed under Alternative 2 (Depressed Trainway) or Alternative 3 (Extended Depressed Trainway) (where the main line connection occurs at Sutro Street).

### ● **Storm Drain and Sanitary Sewer Systems**

Lengthening the corridor requires that the intercepted storm drain system reconstruction also be lengthened. Approximately 2,200 feet of additional length is required to reach a new outlet to the river, located opposite Sage Street. The changes to be made to the sanitary sewer system under this alternative would be the same as previously described.

### ● **Other Utilities**

The required changes to utilities described under Alternative 2 (Depressed Trainway) and Alternative 3 (Extended Depressed Trainway) would also pertain to this alternative.

### ● **Shoofly**

Two changes to the temporary shoofly would occur under this alternative:

- (1) In the downtown core, between Arlington and Evans Avenues, no shoofly on Commercial Row would be needed. This would be replaced by a construction method that would allow main line freight traffic to remain in the immediate vicinity of its existing location. See Chapter 4 for a detailed description of this approach.
- (2) On the east end of the corridor, the shoofly would need to be extended by approximately 1,500 feet to provide for the added length of the corridor.

## **2-7.5 Alternative 5: Modified Extended Depressed Trainway**

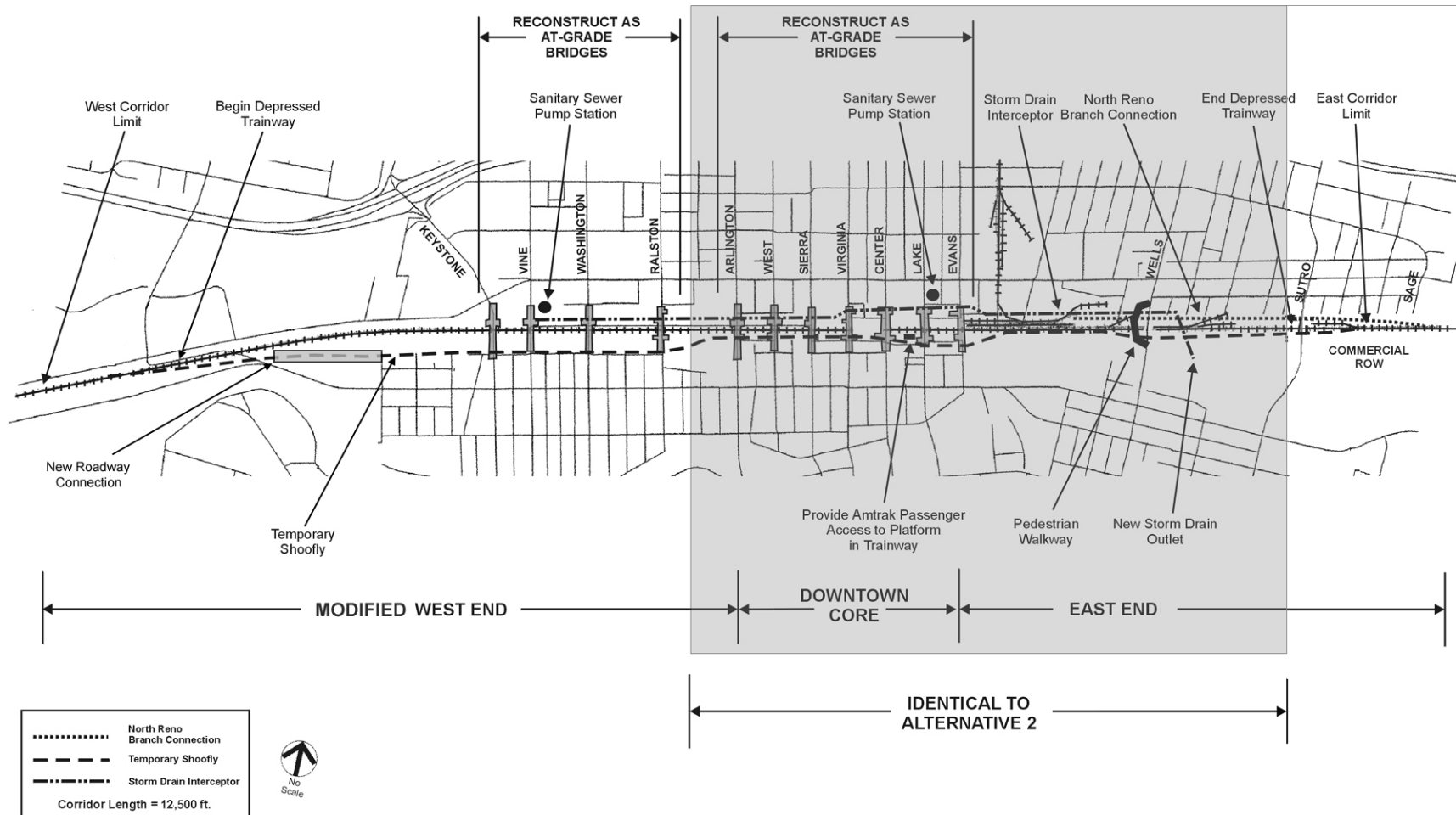
After considering public comment and input from regulatory agencies, at its August 14, 2000 meeting, the Reno Railroad Corridor Project Development Team identified a Preferred Alternative. It was identified as a result of considering a number of cost and environmental benefits that could be achieved, after discussing the pros and cons of each of the alternatives

under consideration in the EIS, and after considering the entire record of impact determinations and public comment. The No Build Alternative was eliminated due to its inability to satisfy the purpose and need for the project. Alternative 4 was eliminated due to overwhelming problems concerning Amtrak passenger safety and comfort in a below-grade tunnel boarding area. The remaining alternatives were then Alternatives 2 and 3. A hybrid alternative, known as Alternative 5, was identified as an approach to the project which would achieve all of the elements of the project's purpose and need and in addition would further reduce both project cost and environmental effects.

The Preferred Alternative would satisfy the alternatives screening criteria as follows:

- (1) It would eliminate 11 existing at-grade rail crossings in central Reno;
- (2) It would have essentially the same beneficial effect on traffic circulation as Alternative 3 (see Section 5-9 for more information);
- (3) It would essentially improve public safety to the same degree as all other build alternatives;
- (4) It would continue freight service to the same degree all other build alternatives;
- (5) It would promote economic development to the same degree as all other build alternatives;
- (6) It would maintain Amtrak service as well as Alternatives 2 and 3;
- (7) It would result in a cost well below the threshold for rejection (see Appendix I); and
- (8) It would be as reasonable to engineer as any of the build alternatives.

Known as Alternative 5, The Preferred Alternative consists of a fully grade-separated two-track main line railroad corridor through the central portion of the City of Reno, from a point approximately 250 feet west of West Second Street on the west end to approximately 50 feet west of Sutro Street on the east end (see Figure 2-19). The corridor would become a depressed trainway descending at a 1.2 percent grade on the west and ascending at a 1.0 percent grade on the east. The length of the corridor would be an estimated 12,500 feet, including the distance needed to connect the temporary shoofly into the existing main line tracks on the west and east ends of the corridor. The depressed trainway would be approximately 54 feet wide and 30 feet deep at its greatest depth (as measured to the proposed top of rail). The Second Street undercrossing would be eliminated, as in Alternative 3. In addition to the definition of the trainway, a decision was also made to eliminate the proposed grade separation at Sutro Street, which was previously planned and described in Alternatives 2, 3 and 4.



Sources: Information Delivery Service, 1999; Myra L. Frank & Associates, Inc., 2000.

**Figure 2-19: Alternative 5 – Modified Extended Depressed Trainway**

Alternative 5 has a number of benefits that make it a desirable choice, as compared with other alternatives under consideration. This alternative, because it is a hybrid of Alternatives 2 and 3, would achieve much or all of the benefits of these alternatives. For example, its 12,000-foot length would result in a desirably short overall project length (Alternative 2 = 11,900 feet; while

Alternative 3 = 13,200 feet), which would result in a smaller amount of required excavation. The railroad profile of Alternative 5 would still be within parameters acceptable to the UPRR.

The cost of Alternative 5 is estimated at the present time to be \$207 million (in year 2000 dollars).<sup>2</sup> Alternative 5 would have a reduced amount of trench excavation and wall construction required, which would translate into reduced cost. It would also result in fewer property acquisitions for right of way purposes than any of the other alternatives, which would also reduce cost.

Alternative 5 would have fewer permanent property acquisitions than any of the other alternatives examined (see Section 5-8). This alternative would reduce the amount of property acquisition along Dickerson Road and it would eliminate all of the acquisitions in the vicinity of Sutro Street. Alternative 5 would eliminate 6 parcels from the list of needed acquisitions.

Alternative 5 would achieve one chief engineering objective, namely to have the least adverse effect on the profile of the local circulation system. This alternative would result in at-grade north-south bridges across the depressed trainway at all central Reno streets except Keystone Avenue, where an increase in grade of approximately 3 feet would be necessary. This can be accommodated with a minimum of vertical adjustment and would not have an adverse effect on internal circulation to adjacent properties.

One of the primary purposes of the proposed corridor is to eliminate the vehicular delay that would otherwise be caused by at-grade railroad crossings. The vehicular delay projected at the railroad crossings in the central portion of the City of Reno is projected to increase substantially under the No Build Alternative due to expected increases in train activity coupled with higher traffic volumes on the cross streets. The traffic impact analysis reported in the EIS computed that the projected PM peak hour vehicular delay attributable to the central Reno railroad crossings would range from approximately 148 to 297 hours under the No Build Alternative. This range is consistent with 24 to 36 trains per day operating through the corridor. The EIS also reported that Alternatives 2, 3, and 4 would completely eliminate the vehicular delay attributable to the railroad crossings in the central Reno area.

Alternative 5 modifies the definition of Alternative 3 by eliminating a grade separated crossing for Sutro Street at the far eastern end of the corridor. Therefore, Alternative 5, unlike the other build alternatives, will not completely eliminate all the vehicular delay associated with the

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<sup>2</sup> This cost estimate has been prepared to support an evaluation of the economic effects of construction. Construction of any build alternative would have a potentially beneficial effect on the economy related to regional output and employment. The economic effects of new construction have been estimated using these project cost estimates and multiplier factors for regional output, as described in more detail in Chapter 4. Estimated costs are based upon project and engineering information available at the time the estimates were prepared. As planning and design work progresses for the Preferred Alternative, refined estimates of cost will continue to be developed.

railroad crossings in the central Reno area. Alternative 5 would have approximately 17 to 34 hours of PM peak hour vehicular delay. This means that Alternative 5 would reduce PM peak hour vehicular delay by 89 percent (132 to 264 vehicle hours daily), as compared with the No Build Alternative, due to the fact that the Sutro railroad crossing would continue to operate as an at-grade railroad crossing.

There is one additional physical component of Alternative 5, which also would be needed. Due to the fact that the West Second Street underpass would be eliminated, an undesirably long cul-de-sac street along Dickerson Road would be created, extending to Keystone Avenue. In order to provide for improved vehicular and emergency access to the properties located on Dickerson Road, a new roadway from Chism Street to Dickerson Road, would be constructed. This new link would be built in an area to be acquired for the temporary shoofly and therefore no additional right of way acquisition would be needed.

A review of other environmental impacts documented in the EIS concluded that the effects associated with Alternative 5 would be essentially the same those described under Alternative 3 for the following impact categories: geological and hazardous materials, hydrology and water quality, air quality, noise and vibration, biology, land use, population and housing, public services and utilities, safety and security, aesthetics, cultural resources, economics, executive orders, and Section 4(f) effects. Also, all of the impacts associated with Alternative 5 are contained within the envelope of impacts identified under either Alternative 2 or 3.

## **2-8 RELATED PROJECTS**

Related projects include projects that may occur within the same general time frame as the proposed action and that may have a bearing on the effects associated with the proposed action, including cumulative or indirect effects. For purposes of the Reno Railroad Corridor, the following are considered related projects.

### **2-8.1 Union Pacific Railroad Tunnel Improvements**

There are a number of existing railroad tunnels along the historic Southern Pacific (now Union Pacific) main line tracks through the Sierra Nevada mountain range connecting Sacramento, California with Reno, Nevada and points east. A series of 15 tunnels ranging in length up to 1,650 feet was originally constructed as part of the Central Pacific Railroad between 1864 and 1869. Since 1869, the railroad has undertaken a number of improvement projects to widen these tunnels, construct additional tunnels, improve grades, and so forth, to permit progressive railroad modernization to take place. At the time of the UPRR/SPRR merger, it was intended that further improvements in the form of tunnel enlargements would be made to permit the passage of double-stacked container trains over this line. Shortly after the merger, this concept was reevaluated and placed at a lower priority, but recently, the UPRR has indicated that it may again wish to pursue these improvements. At the present time, owing to the lack of sufficient tunnel clearance, double-stacked container trains do not pass through the central portion of the City of Reno on the UPRR Central Corridor. If the tunnel improvements were to be implemented, this

constraint would be removed and added freight rail traffic through the City of Reno could occur. Whether and to what degree this would happen has not been estimated, however, and for purpose of this EIS, tunnel enlargements to allow use of double-stacked container trains is considered at the concept level only.

## **2-8.2 Amtrak Service Increases**

Amtrak currently serves the City of Reno at its Lake Street station, with two trains per day (one in each direction) along the “California Zephyr” route connecting Oakland, California (terminal station located in Emeryville) with Chicago, Illinois. Amtrak planning staff<sup>3</sup> (John Johnson, personal communication) have indicated that the “California Capital” service, connecting Sacramento with the City of Reno, may add another train each day in each direction. This decision has not been made as yet, however. Should this expansion of service occur, two additional passenger trains per day would stop at the City of Reno Amtrak station.

## **2-8.3 Reno Development Projects**

The central portion of the City of Reno has recently experienced a period of redevelopment activity, focused on several projects under the control of private property interests. The recent demolition of the former Harold’s Club, with associated anticipated expansion of Harrah’s Hotel/Casino, is an example. As is noted in Section 2-5, one of the Reno Railroad Corridor alternatives critical screening criteria was economic development. Two residential and three non-residential development projects have been identified in the vicinity of the proposed corridor. In addition, the Regional Transportation Commission (RTC) provides some insight into development expectations for the central portion of the City of Reno via its long-term traffic demand model. This model, which projects travel demand to the year 2030, and its underlying assumptions regarding growth in the central portion of the City of Reno, have been used as the basis for the traffic impact analysis and other related impact analyses in this document.

## **2-8.4 Flood Control Planning**

### **2-8.4.1 Truckee River Corridor**

The City of Reno, City of Sparks, Washoe County, and the US Army Corps of Engineers have jointly formed a Truckee River Flood Management Committee Coalition. The coalition is to provide a community based planning effort for the design of flood control improvements on the Truckee River. These flood control improvements are primarily focused on reducing the flood potential to the reach of the Truckee River within the cities of Reno and Sparks.

The community coalition invites members of community, local, state, and federal regulatory agencies to discuss their ideas and concerns with representatives from the cities of Reno and Sparks, Washoe County, and the US Army Corps of Engineers.

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<sup>3</sup> John Johnson, personal communication, March 2000.

Since the beginning of the year 2000, a number of committees have been formed to discuss the historical river hydraulics, river flood limits, environmental impacts, existing river constraints, fishery impacts, flood way encroachments and areas of greatest impact within the commercialized areas of the two cities.

A number of public input hearings have been completed in Reno, Sparks, and Washoe County.

As a result of the efforts to date, a *preliminary draft concept plan* is ready for publication to the Community Coalition. The *concept plan* will present some alternatives to provide flood protection on the Truckee River through the cities of Reno and Sparks. With adoption of a *concept plan*, the lead agencies will begin preparing the *environmental impact statement* for the project. The EIS process is scheduled to begin in 2001.

Upon completion and acceptance of the EIS for the Truckee River improvements, engineering and design could possibly begin in late 2003 or early 2004. Based upon this forecasted schedule, the timing for the Truckee River Improvements could conceivably interact with the final design for the railroad corridor project. The final design of the two projects could work together jointly in mitigating river and fishery concerns.

#### **2-8.4.2 Stormwater Management Program**

A regional Stormwater Management Program (SWMP) for the urbanized area within Washoe County is programmed to develop goals that will not deteriorate water quality in the Truckee River. The Truckee Meadows Inter-local Stormwater Committee (TMISC) has obtained a consultant to develop the first phase of the SWMP.

The consultant will determine goals for the program, determine how aggressive the program should be to achieve the goals, and a timeline in which to accomplish the goals.

Records of existing programs, facilities, and activities for local stormwater management which include cost, objective, and accomplishments in other communities will be reviewed as a guideline.

A Best Management Practice (BMP) program is to be developed which is to include standard plans, specifications, maintenance of storm drain systems, street cleaning, litter control, spill response, and hazardous material disposal. The BMP is to be developed using data from other communities that could be implemented in the Truckee River corridor.

Stormwater discharge monitoring will be developed by reviewing existing historic stormwater quality data, analyzing water quality, and compiling and reviewing previous data on stormwater impacts to the Truckee River. Review of the ongoing monitoring program will be conducted by the cities of Reno and Sparks. With these data, the program will create a water quality model of the Truckee River. The model will be used to predict responses to storm events, analyze the effects of changes in land use in developing areas, examine detention in flood control facilities, and evaluate application of the BMP to minimize contaminant loading to the river.

The consultant will draft a monitoring plan identifying existing illegal discharge points and develop an elimination process, draft an SWMP, research retrofits to existing stormwater systems, as well as structural controls for new systems, and develop an existing storm drain system map which will include irrigation ditch systems.

The program will be developed to comply with the National Pollutant Discharge Elimination System (NPDES) permit using cost-effective measures. The TMISC is currently under contract with the consultant to develop and study the quality of water currently discharging into the Truckee River within the urbanized area surrounding the Truckee River corridor. It is the intent of this program to develop and implement goals in which the urbanized area responsible entities will improve upon the quality of water discharging from existing and proposed storm drain systems. This will be accomplished through a storm water management program by implementing BMPs to achieve water quality goals. The program may have a draft outline completed in time to be incorporated into the final design of the stormwater drainage system for the Reno Railroad Corridor Project.